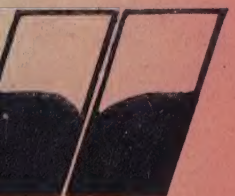


Health Implications of Public Policy

Case Studies, Modules, Methodologies

Edited by
BASU GHOSH



**Indian Institute of Management
Bangalore**

Health Implications of Public Policy

The developing countries in South East Asia are experiencing varying degrees of social and economic change. The governments of these nations are pursuing public policies aimed at faster economic growth and improved health and quality of life for their people. Developmental policies are expected to bring increased prosperity to the people. Unfortunately, however, developmental efforts often entail adverse outcomes in terms of health and quality of life. It is not exactly clear to what extent unintended outputs of development programmes conflict with the goals of the health care system. Nevertheless, it is certainly necessary for development administrators and health system leaders to collaborate for ensuring that such adverse outcomes are kept at as low a level as possible. Intersectoral coordination at all levels of management decision making (public policy formulation, planning, implementation, monitoring and evaluation) is needed to achieve this objective.

Public policies in certain sectors such as agriculture, urban development, industrialization, education etc. have profound positive or negative effects on health and quality of life. Any efforts to ensure health considerations in policy making in these sectors is, therefore, beneficial to the people at large — who are to enjoy the fruits of economic development. The WHO South East Asia Regional Office collaborated with the Indian Institute of Management, Bangalore in organizing a regional symposium at Bangalore in October, 1989 to discuss such policy issues. This publication brings together the carefully prepared modules consisting of teaching cases, case studies and other related materials.

The broad policy linkages studied in this volume are: Agricultural Policy — Health Linkage, Industrialization Policy — Health Linkage, and Urban Policy — Health Linkage. Within these broad spectra of a module on each of the above, specific issues covered are: Pesticide Use, Large Scale Water Reservoir Projects, Industrialization Policy, Occupational Health Hazards in Industry, Child Labour, Housing Policy, Urban Poverty and Slum Problem. Readers interested in any of these specific issues, and its linkage with health, may like to refer to the *Contents* Page and proceed to study a specific case of their interest.

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HEALTH IMPLICATIONS OF PUBLIC POLICY

Edited by
YASH CHAKRA

INDIAN INSTITUTE OF MANAGEMENT
Bangalore, India

February 1981

HEALTH IMPLICATIONS OF PUBLIC POLICY

Case Studies, Modules, Methodology

Edited by
BASU GHOSH



INDIAN INSTITUTE OF MANAGEMENT
Bannerghatta Road, Bangalore 560 076

February 1991.



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FOREWORD

For many years it was believed that development programmes and projects, especially economic ones, would automatically improve health status. While the link between economic improvement and better health is certainly a strong one, growth in income and economic activity does not necessarily lead to improved health status. Many developing countries are threatened with "health crisis", which is contributed by three interrelated problems — the avoidable health hazards associated with development, the rising health care costs caused by urbanization and industrialization, and the economic crises which have slashed health budgets.

The Inter-Agency Regional Conference on Health Development held in New Delhi, India from 20–24 March 1989 gave specific guidance for the first time on how to deal with this crisis. It recommended that the capacity of the Ministry of Health be strengthened to analyze development projects to ensure that they do not have a negative impact on health status, that the policy analysis based on existing problems be undertaken, especially on the underlying causes of high morbidity and mortality, and that health impact assessment be undertaken to identify those aspects that have an influence on the existing situation and modifications be suggested which would eliminate the negative effects of development projects\programmes.

The South-East Asia Regional Symposium on "Implications of Public policy on Health Status and Quality of Life" was organized at Bangalore, India, in October 1989, as a follow-up activity of the above mentioned Regional Conference, and it is the first activity of its kind not only in the South-East Asia Region, but globally.

Its principal objective was to strengthen the negotiating skills of health planners and representatives from relevant sectors for defending and protecting health status in development programmes and

projects. It focuses on the very crucial but often neglected aspects of intersectoral action for health, namely implications of public policy on health status and quality of life.

Since it is impossible to deal with all aspects of public policy, as a first step the relationship between development policies and health status and quality of life were analyzed by in-depth study of three important areas — agricultural development; industrialization and urbanization.

In order to facilitate the discussions at the Symposium, background documents which dealt with specific aspects of agricultural development, industrialization, and urbanization were prepared and presented. Additional case studies, methodology and modules, together with country experiences, enriched the analyses. A separate report on this Symposium had already been published as WHO South-East Asia Regional Office Publication SEA/HSD/144 "Implications of Public Policy on Health Status and Quality of Life", Bangalore, 18-26 October 1989.

The main contributions in the shape of background documents have been provided by the following institutions and individuals: The Indian Institute of Management of Bangalore, India, Dr J.C. Bhatia, Dr R. Dhar, Dr B. Ghosh, Dr S. Roy, Dr V.K. Tewari; The Marga Institute of Sri Lanka, Dr E. Fernando, Dr G. Gunatilleke, Dr N. Gunatilleke, Dr P.D.A. Perera; The University of Indonesia, Dr Ascobat Gani; Harvard University School of Public Health, Dr M. Reich; Centre for Development Studies of Trivandrum, India, Dr P.G.K. Panikar; Dr Aung Tun Thet of Myanmar and Dr U.M. Malla of Nepal.

The background documents presented at the above Symposium were compiled and documented in here, so that health and other development planners, policy decision makers, university teachers, research scholars, etc., will take benefit out of it in fostering further development in the area of finding more solutions to the underlying problems and constraints that are being faced by many of our developing world.



Dr U Ko Ko
Regional Director
WHO South-East Asia Region.

New Delhi
February 20, 1991.

PREFACE

The South East Asia Regional Symposium on 'Implications of Public Policy on Health Status and Quality of Life' (Bangalore, October 1989) provided a significant forum and opportunity to public policy makers, planners and researchers to delve into issues of considerable importance to all developing countries in this region. It is well-known that the health status of our people is not determined by the health sector alone, and the policies and programmes of most other sectors do have a bearing on the health and quality of life of the people. This symposium explored a clearer understanding of the public policy — health linkages, and enabled country representatives to identify leads for public policy making in their respective countries, as part of their strategy to march towards 'Health for All by the year 2000'. The Indian Institute of Management, Bangalore (IIM-B) was privileged to collaborate with WHO in conducting this important symposium. As part of the preparatory work for this, the IIM-B faculty and several other experts in South East Asia developed the background papers for use during the symposium. This volume incorporates these materials.

It will be observed that the modules presented here have been based primarily on secondary sources of data, and discussions with many professionals actively engaged in research in related areas, or administering public policies. We wish to put on record our gratitude to all of them, but we are constrained by space to mention everyone individually. Many institutions and government departments have freely extended their infrastructural support to us for providing us the wealth of information based on which the modules have been prepared. We express our heartfelt thanks to all these organizations.

The academic work for preparation of the Indian cases was shared by an interdisciplinary team of faculty members: Agricultural policies

(Dr. Shyamal Roy and Dr. Jagdish C Bhatia), industrialization policies (Dr. Ranajit Dhar and Dr. Basu Ghosh), and urban policies (Dr. Vinod K Tewari and Dr. Basu Ghosh), with Dr. Basu Ghosh responsible for overall coordination and editing. A case was also contributed by Dr P.G.K. Panikar of the Institute of Development Studies, Trivandrum. Preparation of the Sri Lankan case studies was coordinated by Dr. Godfrey Gunatilleke of the Marga Institute, Colombo. The Indonesian case was contributed by Dr. Ascobat Gani and Dr. Ronnie Rivany of the Faculty of Public Health, University of Indonesia, while the Myanmar case was contributed by Dr. Aung Tun Thet. The IIM-B faculty team benefited immensely from close interactions with Dr. Michael R Reich, Director, Takemi Program in International Health, Harvard University School of Public Health.

The publication of this volume in its present form has been made possible through a WHO grant from the Division of Strengthening Health Systems, for which we are grateful to Dr. E. Tarimo, Director (SHS), WHO-HQ. We wish to express our thanks to Dr. (Mrs) A. Hammad (SHS/ISC) of WHO-HQ for her interest and guidance. We are grateful to Dr. U. Ko Ko, Regional Director, WHO-SEARO for encouraging us by seeking our collaboration, and Dr. Uton M Rafei (Director, HSI, SEARO), Dr. D.B. Bisht (Director of Programme Management, SEARO) and Dr. Sonja Roesma (Regional Adviser — PHC, SEARO) for their active collaboration and support. We are grateful to Dr. K.R.S. Murthy, Director, Indian Institute of Management, Bangalore for his active support and encouragement. Last but not the least, I wish to convey my appreciation and thanks to our efficient secretaries who ungrudgingly obliged us by typing and retyping our numerous drafts and revisions.

Bangalore
February 20, 1991.

Dr. Basu Ghosh

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TABLE OF CONTENTS

	<i>Page</i>
Foreword — U. Ko Ko	i
Preface — Basu Ghosh	iii
List of Contributors	v
<i>Introduction</i> — Basu Ghosh	1
<i>Module I : Agricultural Policy — Health Linkage</i>	
I.1 : Pesticide use in Indian Agriculture — Shyamal Roy	4
I.2 : The Narmada Valley Project — Jagdish C Bhatia	18
I.3 : Agricultural Policies and Their Impact on Health : The Case of Sri Lanka — Earley Fernando and Godfrey Gunatilleke	56
I.4 : The Mahaweli Project — P.D.A. Perera and Godfrey Gunatilleke	88
I.5 : The Sedawgyi Multipurpose Dam and Irrigation Project — Aung Tun Thet	117
I.6 : Schistosomiasis Eradication: Case of Sulawesi, Indonesia — Ascobat Gani and Ronnie Rivany	124
I.7 : Adverse Effects of Development Programmes on Health : Irrigation Project on Malaria — P.G.K. Panikar	142
I.8 : Policy Options.	170

Module II : Industrialisation Policy — Health Linkage

II.1 : Occupational Health Hazards and Safety in Indian Industries — Ranajit Dhar	175
II.2 : Toiling Children — Basu Ghosh	200
II.3 : Industrialization Policy and Health in India — Ranajit Dhar	220
II.4 : Policy Options	250

Module III : Urban Policy — Health Linkage

III.1 : Healthy Housing : Urban India — Vinod K. Tewari	256
III.2 : Slums in India — Basu Ghosh	287
III.3 : The Urban Poor : Case of Sri Lanka — Nimal Gunatilleke	327
III.4 : Urban Policies and Health Implications in India — Vinod K Tewari	357
III.5 : Policy Options	373

*Methodologies for Policy Analysis on
Inter-Sectoral Action — Basu Ghosh*

376

INTRODUCTION

Intersectoral action for health is recognised to be an essential strategy for achieving the goal of Health for All by the Year 2000. It is not a sufficient condition for health development only to improve health policies and manage health services efficiently, though these are very necessary. Since policies and programmes in several key sectors of the economy influence health of the people favourably or unfavourably, it is also necessary for us to focus our attention on such policies, and evolve strategies for ensuring that their adverse health outcomes are minimised and favourable health outcomes are maximised. It is indeed a challenging task to influence public policy making in support of health, but the challenge has to be faced squarely. WHO and its member-states, through the able and inspiring coordination of the section on Intersectoral Cooperation of the WHO Division of Strengthening Health Systems, have been striving to meet this challenge. As part of this effort the WHO South East Regional Office collaborated with the Indian Institute of Management, Bangalore to conduct a key symposium in October 1989 at Bangalore on 'Implications of Public Policy on Health Status and Quality of Life'*. This symposium brought together a dedicated group of senior administrators from health and some other key sectors of the economy from eight countries in South East Asia.

The symposium was conducted using a well-structured programme with maximum emphasis on participatory approach. Participation was ensured through small group discussion on specially prepared real-life cases. The discussions were focussed on specific public policy issues, methodological problems of public policy—health impact

* See "The Implications of Public Policy on Health Status and Quality of Life: A Symposium", Bangalore 18-26 October 1989, World Health Organisation, SEARO, New Delhi.

measurement, and tentative country-level action plans on public policy issues of health relevance. It was decided, in consultation with WHO, that the Symposium would especially address three specific areas of public policy, with likely impact on health and quality of life, which were:

- i) Agricultural Policies.
- ii) Industrialization Policies, and
- iii) Urban Policies.

Accordingly, a module on each of the above policies was prepared. This publication incorporates these modules prepared as the main background documents for the Bangalore Symposium. The modules were specifically designed in the developing country and South East Asia context as the basis for initiating discussion.

The Modules

Module I: Agricultural Policy — Health Linkage

- I.1 Case on 'Pesticide use in Indian Agriculture'.
- I.2 Case on 'The Narmada Valley Project'.
- I.3 Case Study on 'Agricultural Policies and their Impact on Health: Sri Lanka'.
- I.4 Case Study on 'The Mahaweli Project, Sri Lanka'.
- I.5 Case Study on 'The Sedawgyi Multipurpose Dam and Irrigation Project, Myanmar'.
- I.6 Case Study on 'Schistosomiasis Eradication: Sulawesi, Indonesia'.
- I.7 Case Study on 'Adverse Effects of Development : Irrigation on Malaria'.
- I.8 Policy Options.

Module II: Industrialisation Policy — Health Linkage

- II.1 Case on 'Occupational Health Hazards and Safety in Indian Industries'.
- II.2 Case on 'Toiling Children'.
- II.3 Case Study on 'Industrialization Policy and Health in India'.
- II.4 Policy Options.

Module III : Urban Policy — Health Linkage

- III.1 Case Study on 'Healthy Housing: Urban India'.
- III.2 Case on 'Slums in India'.
- III.3 Case Study on 'The Urban Poor: Case of Sri Lanka'.
- III.4 Case Study on 'Urban Policies and Health Implications in India'.
- III.5 Policy options.

Considerable gaps in research information and other relevant data were noted by the faculty teams in course of case development. The concluding chapter of this volume presents a discussion paper on the key methodological issues of public policy analysis. The readers may consider the available options and decide on undertaking substantive research or policy analysis to promote intersectoral action in support of health.

It will be noted that a module consists of two or more cases or case studies and a separate section entitled 'policy options'. The case materials pertain to India, Sri Lanka, Indonesia and Myanmar of the South East Asia region. While the Indian material are mostly in the form of teaching cases, the Sri Lanka, Indonesia and Myanmar materials are in the case study format, but all these materials are meant to provoke discussion rather than to present pedantic stances of researchers. The section entitled 'policy options' is intended to lead the readers (policy makers, researchers and sector leaders) to meaningful introspection on the issues embodied in the case materials. The participants of the Bangalore Symposium deliberated on each case in depth, based on a series of questions on that case, and came up with a series of policy options. These are the policy options that are presented towards the end of each module, and the readers have been invited to explore these options further in the light of their own knowledge and experience. Such introspection is expected to help the readers experience learning similar to what the participants of the Bangalore symposium experienced. Should teachers of public policy like to use the case materials in each module in class room situation, they may prepare a set of questions specific to each case and moderate the discussion as necessary. Instructor's guides and illustrative question sets on the Indian cases are available with the Indian Institute of Management, Bangalore.

PESTICIDE USE IN INDIAN AGRICULTURE

INTRODUCTION

In India, the long term growth in both agricultural and foodgrain production has barely kept pace with the rate of growth of population. Between 1949–50 and 1986–87 the annual increase in agricultural as well as in foodgrain production was 2.6 percent, while population grew at an average rate of 2.2 percent. Throughout the period, production increase was well below the increase in market demand of about 3.2 percent per annum (Exhibit 1).

There is, thus, a growing need for increasing agricultural production in India. Unfortunately, the scope for increasing production through horizontal expansion of land is very limited. Cultivated area, which made significant impact on agricultural output in the 50s has registered a sharp decline over time; the annual increase has come down from 1 percent in the 50s to 0.4 percent in the 60s to about 0.1 percent presently. India had to chalk out a strategy for increased agricultural production against this background.

The yield-augmenting technology, popularly known as HYV technology, which India adopted, consists of a package of practices eg. complementary use of high-yielding varieties, fertilizers and irrigation. Timing of use of these inputs as also the correct dosages are crucial to the success of the technology, which has made a significant impact in India (Exhibit 2).

This case was prepared by Shyamal Roy, Indian Institute of Management, Bangalore. It is intended as a basis for discussion rather than to illustrate either effective or ineffective handling of an administrative situation. Funds for its preparation were provided by a grant from WHO. Case 1.1.

The new high-yielding crop varieties and the cropping sequences implied in the HYV technology (i.e., intensive cultivation of land) has, however, resulted in an increase in pest problems in agriculture and, pesticide use, accordingly, has gone up¹.

Prior to 1966, for example, pesticide use was largely confined to public health sector. Such uses accounted for more than half of the pesticide use in the country. The weightage has, since, shifted in favour of agriculture. Currently, out of the total pesticide consumption of around 70,000 tonnes, agriculture absorbs about two-third. This consumption is projected to grow at more than 8.5 percent per annum during the seventh plan period. The increase is considered inevitable to induce a wider diffusion of the HYV technology which holds the key to the realization of the plan targets in respect of agricultural production (Exhibit 3).

PATTERN OF CONSUMPTION

Pesticide use varies considerably among regions and crops. Andhra Pradesh accounts for 34 percent of total consumption followed by Karnataka (16.2%), Gujarat (15.2%) and Punjab (11.4%). The balance (about 24%) is shared among the rest of the 19 and odd states. On a per-hectare basis Tamil Nadu has the highest use at 1.8 kilograms, followed by Punjab at 0.87 kilogram, Andhra Pradesh at 0.83 kilogram and Gujarat, Jammu and Kashmir and West Bengal, each at around 0.6 kilogram. In other states, the average use per hectare is low.

Crop-wise, cotton takes up 45 percent of the total pesticide consumption; rice comes a distant second at 22 percent, followed by jowar at 9 percent. In oilseeds, pulses and fruits and vegetables, pesticide use is relatively low. Per unit of production, cotton still ranks highest (19 kgs/ton); however in none of the other crops including paddy (0.18 kg/ton), pesticide use exceeds 0.33 kg/ton. In fact, in most of the crops the average use is considerably lower than this.

On average, Indian consumption of pesticides is low by international standards. Compared to an average consumption of 10 kilograms per hectare in Japan, 2 kilograms per hectare in UK, 1.6 kilograms per hectare in USA, Indian consumption is a meagre 0.35 kilogram per hectare. For intensive cultivation, Indian pesticide use is generally at par with that in other advanced countries (for example, average dose on cotton comes to almost 3 kilograms per hectare). Comparable

data on pesticide use in developing countries *vis-a-vis* India are not readily available.

Upto mid-sixties, BHC and DDT were the main types of pesticides in use — mostly in public health sector. With the rapid increase in pesticide use in agriculture, other types have proliferated. The share of BHC/DDT in total pesticide consumption declined from 82.3% in 1965–66 to 56.2% in 1985–86. Internationally some 423 types of pesticides of varying degrees of efficacy, safety and costs are in existence. Presently in India, there are 127 different types of pesticides in use, of which, about 20 account for 85 per cent of production (Exhibit 4). Domestic production capacity is presently adequate to meet the current as well as the future demand for most types of pesticides in use; however, certain types are imported in small quantities.

Pesticides are distributed through three main sources — state departments, cooperatives, and private trade. However, private trade dominates with 76% share in the distribution. Cooperatives account for 21% and state departments only 2%².

EFFECTS ON HEALTH

A spate of literature exists in India on the ill-effects of pesticides on health^{3,4,5}. The main findings can be summarized as follows:

- a) the toxic effects of pesticide use are very high among workers who spray pesticides;
- b) food commodities in India are highly contaminated with pesticide residues of DDT, BHC, Lindane, endrin, etc. The residues appear to be within permissible levels only in fruits and spices. However, the levels are close to or above the tolerance limits in a number of samples of vegetables, cereals, oils, and dairy products. As pesticides are lipophilic, they tend to accumulate and concentrate in the body fat of man;
- c) pesticide residues are caused not by spraying in agriculture alone. Pesticides like DDT and BHC, which is mostly used for public health purposes, once spread, do not degrade easily and can persist in the environment for as long as 20 years. The soil then becomes a reservoir for these pesticides steadily transferring them to edible crops, polluting the groundwater, trees and wild-life.

While there is conclusive evidence of the presence of pesticide residues in food, human fat and atmosphere, data on its exact effect on health (i.e., morbidity, mortality, productivity etc.) are scarce. The problems cited are two fold:

- a) Pesticide affects health slowly over a long period of time. Thus it is very difficult to establish through epidemiological information from general public what specific associations exist between pesticides and syndromes produced in the human body. Fragmentary evidence for target groups in India, point to liver injury due to toxic effects of pesticides (HCH) among workers who spray pesticides^{6,7}. On the other hand, WHO has reported on the long-term effects of DDT on spraymen exposed to it, through their work in India and Brazil surveying a total of 1,200 spraymen a year, and no ill-effects due to DDT could be found although blood levels remained above normal for several years after the men took on other work⁸. Yet another study, drawn from laboratory tests conducted on animals, shows a larger susceptibility to ill-effects of pesticides among less nourished than better nourished people⁹.
- b) Indicators like “acceptable daily intake” of residues (ADI), maximum residue limits (MRL) which bring out the potential effects of pesticide use, if not actual, and which are used in many studies done in India, are based on toxicological and residue data collected from global sources¹⁰. These indicators are not worked out under Indian conditions.

Given the small average use of pesticides in India, compared to other countries, such a high incidence of residues in food, human fat and atmosphere, is largely attributed to misuse of pesticides—wrong timing, wrong type, wrong dosage, inappropriate usage etc. This, in turn, is ascribed to lack of knowledge, tardy implementation and socio-economic conditions of users.

GOVERNMENT LEGISLATION / POLICIES

The Government of India has been concerned about the possible ill effects of pesticide use on human beings, animals, wild life, birds and the environment at large. The Seventh Plan document reiterates this by stating “while seeds and fertilizers are basic inputs to increase agricultural production, plant protection measures are required to

save the crops in the field from the ravages of pests and diseases. However, the use of pesticides has to be judicious and need-based"¹¹.

Out of the above concern, India passed in 1968, a comprehensive legislation called the Insecticides Act 1968. Under various sections of the Act two statutory bodies, namely, The Central Insecticides Board (Advisory body) and the Registration Committee (Implementing body) have been constituted. The main objective of this act is to regulate import, manufacture, sale, transport, distribution and use of insecticides with a view to preventing risk to human beings, animals and other matters connected therewith. Implementation of this Act, along with the Rules framed under this Act in 1971 started from 1st August, 1971. The regulatory practices and enforcement measures in India are summarised in Exhibit 5.

Besides the Act, the government's Seventh Plan policy thrust has been on need-based use of plant protection measures instead of prophylactic treatment:

"The use of pesticide is undertaken when the pest population increases beyond the economic threshold level. Vigorous control of pests and diseases in endemic areas, would, however, be continued as at present. Steps will be taken to strengthen the surveillance organizations. Aerial spraying of pesticides would be taken up in increasing measures for meeting the pest and disease attack on crops like oilseeds, cotton, etc. More Central Biological Stations and Central Surveillance Stations are proposed to be set up during the seventh plan period. The major thrust of government policy on plant protection in the coming years will be the Integrated Pest Management (IPM). The IPM approach implies the adoption of cultural, mechanical, biological and chemical methods of control"¹².

How far has the implementation of the provisions of the Insecticide Act 1968 been satisfactory? Efforts to register various pesticides for their safety have been reasonably successful. But there are other imponderables to reckon with. For example one set of views is that: (a) the data base on pesticide toxicants is poor because of isolated efforts by Agricultural Universities and Research Institutions. An attempt to generate coordinated data through the All-India Coordinated Project on Pesticide Residues Analysis has not succeeded

substantially because of lack of facilities, (b) the infrastructure in the country to implement this Act is totally inadequate and (c) the act had become a happy hunting ground for money grabbing officials^{13,14,15}.

The other set of views derives from discussions with key government officials and points to the practical difficulties of implementing the Act satisfactorily, given the socio-economic environment of the country.

Farmers are ignorant about pesticide use, they are poor, restless to reap a good and quick harvest and, hence, spray pesticides at the wrong time and of the wrong type, which are strong, but banned for use in agriculture (DDT, BHC). Similarly, agricultural labourers who spray pesticides are too poor and too much in need of employment to worry about health hazards in their jobs; also, some of the safeguards suggested in the Act are not only costly but also unsuitable under tropical agriculture conditions¹⁶.

The Integrated Pest Management Policy (IPM) involves the following:

- a) Indirect control involving field sanitation, healthy seeds, crop rotation etc.
- b) Direct control involving soil exposure by tillage, destruction of eggs, removing infested parts, preventing migration by trenches or flooding etc.
- c) Biological control in case of insular areas involving sedentary pests by using parasites and predator of pests.
- d) Chemical control involving the selected use of Chemosterilants Anti-feedants, Antibiotics etc.
- e) Biotechnology in pest control especially gene-cloning or recombinant DNA technology for producing plants resistant to insects and diseases.

Minimum use of pesticides coupled with one or more IPM techniques has worked well when there has been strict surveillance and forecasting of the major crop pests. The principles of IMP have not yet been fully explored in all the crops¹⁷.

It is not clearly known what has been done in terms of improving the agricultural practices, implied in the seventh plan policy objectives for plant protection.

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EXHIBIT 1

**Growth Rates in Foodgrains and Agricultural Production,
Population and Demand
(Percentage Per annum)**

<i>Period</i>	<i>Foodgrains Production</i>	<i>Agricultural Production</i>	<i>Population</i>	<i>Demand</i>
1949/50— 1986/87	2.6	2.6	—	—
1950— 1980	—	—	2.2	—
1950/51— 1986/87	—	—	—	3.2

Source: Estimated from data contained in various issues of *Economic Survey*, Ministry of Finance, Government of India.

EXHIBIT 2

**Area, Production and Yield of
Foodgrains — 1964/65 – 1986/87
(Growth per annum)**

Area	0.3%
Production	2.6%
Yield	2.3%

Source: Estimated from data contained in various issues of *Estimates of Area and Production of Principal Crops in India*, Directorate of Economics and Statistics, Ministry of Agriculture, Government of India.

EXHIBIT 3

Targets of Key Inputs — Seventh Plan

<i>Item</i>	<i>Unit</i>	<i>Assumed Base 1984–85</i>	<i>Plan Target 1989–90</i>
Seeds	million quintals	7.52	12.44
Fertilizer	million tonnes	8.37	13.50–14.00
Pesticides	thousand tonnes	50.00	75.00
Total HYV	million hectares	56.00	70.00
Irrigation	million hectares		
a. potential		67.89	80.79
b. utilization		60.47	71.37

Source: Summarised from data contained in *Seventh Five Year Plan — 1985–90*, Planning Commission, Government of India.

EXHIBIT 4

**Major Pesticides used in India and their
Rankings in terms of Health Hazard**

<i>Type of Pesticides</i>	<i>Rank</i>
BHC	3
DDT	3
Malathion	4
Parathion Mathyl	1
Metasystox	NA
Fenthion	2
Dime thoate	3
DDVP	2
Quinalphos	3
Monocrotophos	2
Phosphamidon	1
Thimet Phorate	1
Ethion	3
Endusulphan	3
Cypermethrin	3
Copper Oxychloride	4
Dithon	4
Paraquat	3
Aluminium Phosphice	7

1 = Extremely Hazardous; 2 = Highly Hazardous;

3 = Moderately Hazardous; 4 = Slightly Hazardous;

7 = Unclassified.

Source: WHO for Ranks and, Ministry of Industry, Government of India for Type of Pesticide.

EXHIBIT 5

**Summary of Pesticide Regulatory Practices and
Enforcement Measures in India**

A. Regulatory Scheme

1. Pesticide Legislation/ Registration	The Insecticides Act, 1960 (Act No.46 of 1968). The Insecticides Rules, 1971.
2. Administering Authority	Ministry of Agriculture.
3. Registration and Data Requirements Compared to FAO Guidelines	Requires additional local toxicology efficacy residue data.
4. Labelling of Pesticides Ref. FAO Guidelines	Own toxicity limits imposed for label purposes.
5. Classification of Pesticides based on WHO	Modified toxicity limits.
6. Phased Registration Operated	Yes, Provisional — 2 years, full.
7. Average time requirement for Registration	6 months to 3 years.
8. Number of Products registered: Active Ingredients Formulations	127 Not Available.
9. Control of Imports of Pesticides	Mandatory.
10. Control of Manufacture, Formulation, Sale and Use of Pesticides	Mandatory.

A. Regulatory Scheme

- | | |
|---|--|
| 11. Controls on the Persistent/toxic products | Optional
Very high usage of DDT and BHC |
|---|--|
-

B. Enforcement of Regulations

- | | |
|--|--|
| 1. Products Inspected for Quality:
Production | Monitoring by regulatory agency/self inspection by private sector. |
| Post Distribution | Monitoring by regulatory agency. |
| 2. Registration conditions enforced through inspection programme | Occasional. |
| 3. Enforcement of Use Directions | Minimal. |
-

C. Applicator/Safety and Human Exposure

- | | |
|--|-------------|
| 1. Applicator/Dealer Training Programmes | Regular. |
| 2. Extent of Farmer Training in the safe use of pesticides | Occasional. |
| 3. Medical/First Aid treatment Facilities for Pesticide Poisonings | Minimal. |

D. Monitoring Activities

- | | | |
|----|--|-------------|
| 1. | Monitoring of Residues
on Food and Horticultural
Crops | Regular, |
| 2. | Monitoring of Residues
in the environment. | Occasional. |
| 3. | Monitoring of pesticide
formulations at Dealers
and Distributors | Occasional. |
-

Source: Handbook on the Use of Pesticides in the Asia-Pacific Region, November 1987, Asian Development Bank, Manila, Philippines, pp. 72-79.

THE NARMADA VALLEY PROJECT

INTRODUCTION

Irrigation is considered essential for improving the productivity of agriculture. For this purpose man has been building dams since the beginning of historical era. In fact, a large number of irrigation works built many centuries ago in a number of ancient civilisations such as Babylonia, Egypt, Ceylon and Cambodia and which still remain, bear ample testimony to the skills of ancient people in constructing such irrigation systems. With the advancement of concrete technology and availability of huge machines, it has been possible to build dams of size and complexity which could not have been imagined earlier. Furthermore, with the availability of financial assistance, both from multilateral and bilateral agencies, dam building activity has been in recent times pursued at an accelerated pace in many developing countries.

Soon after India's Independence, multipurpose projects and other dams came to be regarded as essential for meeting the critical requirements of irrigation for agriculture, electricity for industries, and flood control. During the last three decades, the pace of dam building has accelerated dramatically in India and about 1600 dams of varying sizes have been built so far at an approximate cost of Rs. 16,000 crores. (See Exhibit 1 for basic information about India's highest dams). In spite of the construction of a large number of dams, only a fraction of the country's hydro-power potential has been realised. This indicates that dam construction is going to be an important development activity in coming years.

This case was prepared by Jagdish C. Bhatia, Indian Institute of Management, Bangalore. It is intended as the basis for discussion rather than to illustrate either effective or ineffective handling of an administrative situation. Funds for its preparation were provided by a grant from WHO. Case 1.2.

One of the largest multipurpose water management projects in India is Narmada Valley Project (NVP). This project is likely to have profound effect both directly and indirectly, on the lives of a large number of people. Those responsible for the planning and implementation of the project stress that the building of these dams is essential for overall development of the area, and that the benefits like hydro-electricity, irrigation and flood control, industrial and domestic water cannot be achieved unless water is stored in a reservoir created by these dams. The antagonists of the dam, who are primarily environmentalists, argue that construction of these dams will not only bring ecological disaster but will perpetuate the poverty of rural masses, particularly tribals, by enabling a few landed elites to gain at the expense of others. Another harmful impact of dam building on the people, according to some observers, is the likely increase in the incidence of water-borne diseases such as malaria, filaria, schistosomiasis, fluorosis etc. According to a report prepared by the Centre for Science and Ecology:

“Irrigation reservoirs generally cover a large area with shallow weed-infused edges. The latter provide breeding ground for disease-carrying mosquitoes. Malaria occurs commonly among construction workers, and among the local population later unless special precautions are taken. Filariasis, and Japanese Encephalitis may also appear and become endemic in such areas”¹.

Dr. V. Ramalingaswami, former Director General of Indian Council of Medical Research indicates:

“The Raichur district of Karnataka state has become highly endemic for malaria after Tungabhadra’s damming and canal network development”².

Are there ecologically sound and economically viable alternatives to these large scale water resource management projects? If dams are inevitable for a large country faced with the task of feeding millions and for meeting its energy requirements, can the side effects be minimised and adequately managed? What policies has Government of India pursued to have an integrated approach to a large development project like Narmada Valley Project?

* One lakh = 100,000

One crore = 10 million .

BACKGROUND

During the post-Independence period, India has achieved a multi-faceted socio-economic development and has not only become self sufficient in agricultural production, but is now the tenth most industrialised nation in the world. It is the seventh biggest country in the world with an area of 32,87,263 sq kilometres and population (1981 census) of 685 millions. Approximately four-fifths of the population live in the rural areas. Agriculture is the backbone of India's economy and has received greater emphasis in the successive Five Year Plans. A Government of India document mentions that:

“This sector, today provides livelihood to about 70 per cent of labour force, contributes nearly 75 per cent of the net national product and accounts for sizeable share of the total value of country's exports. It supplies the bulk of the wage goods required by the non-agricultural sector and raw material for a large section of industry”³.

The input of water is considered vital for realising the full potential of the country's agriculture and its contribution to the country's development. The optimum development and efficient utilisation of water resources, therefore, assumes great significance. Sustained and systematic programme for development of irrigation was taken up with the advent of planned development in 1951. The policies and programmes for the development and regulation of the country's water resources, both surface and ground water, are broadly laid down by the Ministry of Water Resources, Government of India. However, it is the responsibility of the state governments to plan, fund and implement projects for the development of water resources and flood control. The role of the Ministry of Water Resources is essentially policy formulation, overall planning, development and management of water as national resources and monitoring the development of irrigation in the country. Thus the functions of the Ministry primarily are: sectoral planning, coordination, policy guidance, technical examination and assistance in the resolution of inter-state disputes and implementation of inter-state projects.

The Government of India has programmed to extend irrigation to the entire land area that can be brought under irrigation (estimated to be 1.30 lakh hectares) by the turn of the century. This will be done by developing a large number of irrigation projects. Whereas the total outlay on major and medium irrigation upto the end of Seventh Five Year Plan was Rs. 15,000 crores, the outlay for the Seventh Plan

alone is Rs. 11,556.56 crores⁴. During the post-Independence period a large number of river valley projects has been taken up. These projects not only provide irrigation to large tracts of lands, but also step up electricity generation for industrial and domestic use.

In order to achieve the targets in a shorter time frame, internally available resources are augmented through financial assistance from the World Bank Group as well as other multilateral and bilateral agencies.

The Narmada Valley Project (NVP) is the biggest of the river valley projects taken up in India so far. The Narmada basin extends over an area of 98,796 sq. kilometres (Madhya Pradesh 85,859, Maharashtra 1,538 and Gujarat 11,399) and lies between east longitude 72°32' to 81°45' and north latitude 20°20' to 23°45'. Lying in the northern extremity of Deccan plateau, the basin covers large areas in the states of Madhya Pradesh and Gujarat and smaller areas in Maharashtra. The 1,300-kilometre long river Narmada is the largest west flowing river of the Indian Peninsula. The river flows into the Arabian sea. The deciduous natural forests cover 32 per cent of Narmada basin. In its vast basin live 20 million people, nearly half of them are tribals and scheduled castes (See Exhibit 2 for map).

DEVELOPMENT OF NARMADA VALLEY PROJECT (NVP)

The surface water potential of the Narmada river system has been assessed by different committees. The very first assessment was made by the First Irrigation Commission (1901–1903). With regard to the provision of irrigation facilities in the Narmada basin, the Commission remarked:

“Nerbudda and Tapi river appear to be less urgently required as a measure of protection from famine and great caution must be exercised in introducing canal irrigation in black cotton soil tracts of Gujarat. A Nerbudda canal in black soil could not possibly pay, or be justified for the protection of the community in seasons of extreme drought”⁵.

Since the Narmada tract was not subjected to any serious famines, the utilisation of its water had not, in the past, been given serious consideration. Furthermore, since the soil in the basin is generally retentive and capable of producing fairly good harvest even in the years of scanty rainfall, any large scale irrigation development was

not taken up seriously. This accounts for the absence of major irrigation works in this area. However, faced with recurring droughts and floods in many parts, the Gujarat government thought of harnessing the potential of Narmada river. The government also recognised that:

“A traditional irrigation system often fails to provide adequate and timely supply of water that would be responsive to the needs of modern agriculture. The traditional system also involves large scale conveyance losses and leads to serious problems of waterlogging and salinity due to excessive use of water”⁶.

The Government of Gujarat therefore sanctioned the Bharauch irrigation project in the year 1960. It was proposed to construct a dam with FRL plus 162 at Navagam to irrigate 3.9 lakh hectares in the Bharauch and Baroda districts of the Gujarat State. The project also envisaged the subsequent raising of the dam and together construction of high level canal to irrigate larger areas. The work on this project was inaugurated on 5th April, 1961 by the then Prime Minister of India, Mr. Jawahar Lal Nehru. All the preliminary work on this project, such as approach roads, colonies, workshops etc. have been completed. Meanwhile, a study carried out by the Government of Gujarat found that the construction of dam with a higher height at this site would enable the state to realise greater benefits. Accordingly the Gujarat Government proposed in 1963 that the height of the Navagam dam should be raised to FRL plus 425. It provided for the construction of a higher level canal taking off from Navagam with FSL plus 300 and irrigating 1.6 million hectares. The scheme also included the reclamation of the little Rann of Kutch and irrigation of 3.6 lakh hectares there. The proposal however involved the submersion of two dam sites in Madhya Pradesh and Maharashtra and inter-state Agreement was required. In November 1963, the state reached a tentative Agreement but it was not ratified. Further efforts to resolve the differences between the three states by mutual discussions also failed. In 1964, the Government of India set up the Narmada Water Resources Development Committee (NWRDC). After a detailed study the Committee submitted its report recommending the optimum utilisation of Narmada waters and allocation between different states. The Committee also made recommendations regarding sharing of costs and benefits. The Government of Gujarat accepted the recommendations of the Committee, but Madhya Pradesh and

Maharashtra rejected them. Further efforts by the Government of India to bring about an agreed solution to the problem were unsuccessful. Therefore the Gujarat government requested the Government of India to appoint a Tribunal for the adjudication of the dispute under the Inter-state Water Disputes Act, 1956. The Government of India constituted a Tribunal in October, 1969⁷.

The Tribunal announced its award in 1979. In pursuance of the decisions of the Narmada Water Disputes Tribunal (NWDT), the Government of India set up the Narmada Control Authority. It started functioning from December, 1980 and it was further strengthened during 1987. The role of the Authority comprised:

“Coordinating and directing the Narmada basin development projects and taking such measures as are necessary or expedient for the protection of the environment and preparing schemes for the welfare and rehabilitation of oustees and other affected persons due to these projects”⁸.

In addition, the Sardar Sarovar Construction Advisory Committee (SSCAC) located at Vadodara was also set up by the Government of India in accordance with directions of the Narmada Water Disputes Tribunal (NWDT) for the purpose of scrutinising the estimates, technical features, designs of Units I and III (Dam and Power Portion) and the annual works programme of the Sardar Sarovar Project (SSP)⁹.

Soon after the report and final decision of the Narmada Water Disputes Tribunal (NWDT) became available in December, 1979, Government of Gujarat prepared the Sardar Sarovar (Narmada) project report in January, 1980 envisaging:

“creation of a dam reservoir with FRL of 455.00 ft, main canal with FSL 300 ft. and hydropower installation of 750 MW (150 MW x 5 units) in the River Bed Power House and 450 MW (75MW x 5 units) in the Canal Head Power House. The project was to serve a CCA of 21.19 lakh ha. with an annual irrigation of 15.26 lakh ha. The estimated cost of the project was then Rs. 3,333 crore”¹⁰.

The Government of Gujarat also constituted the Narmada High Power Committee (NHPC) under the Chairmanship of Chief Minister of Gujarat (See Exhibit 3 for composition of the Committee).

Having regard to the huge cost and unique dimensions of several components of the project and above all the importance of the project in relation to the future development of the state as a whole, Government of Gujarat (GOG) decided to approach the World Bank (IBRD) for financial assistance. Government of Gujarat prepared an Identification Report based on the January 1980 Project Report and forwarded the same to the Bank though the cost of the project, according to the report was Rs. 2,348 crores. This envisaged lining of the main canals upto 100 cfs capacity only. The Identification Report was examined by the Bank.

Simultaneously the Bank on its own also started looking into the planning aspects of the project in 1980. A couple of missions were mounted by the Bank purely for identification purposes. As a result, the Bank produced a document "Planning for Narmada Development (Gujarat)" in two volumes in November 1980 and forwarded the same to GOI and GOG. Volume-I covered "The Planning Framework" and Volume II the "Technical Annexes." The document outlined the first assessment of project planning needs in relation to implementation of such a huge project both in short-term and long-term perspectives. The second volume (Technical Annexes) contained the detailed parameters of some of the major studies that had to be undertaken. It was felt by the Bank that the data base and the studies on which the Project Report of January 1980 was prepared fell short of what was needed for such a comprehensive project.

The framework given by the Bank was studied by the GOG and GOI. Thereafter a detailed dialogue took place between the officials of the Bank, GOG and GOI during 1981.

In order to prepare a detailed planning frame for the conduct of studies required for the Project in the long run, based on the recommendations of the Bank, the Narmada Planning Group (NPG) was set up in April 1981. The NPG was designed to function at a policy making level and to report directly to NHPC. It was envisaged as a liaison and guiding agency between the NHPC and implementing agencies. The specific objectives laid down for NPG have been to formulate medium term and long-term plans for the Narmada project including distribution systems, command area development and rehabilitation and resettlement of displaced persons. The organisation has also to monitor implementation of these plans and reformulate them in the light of the experience gained. (For composition of the NPG see Exhibit 4).

The Bank had suggested a comprehensive range of planning studies to be undertaken and completed for the project appraisal to be carried out by them. Thereafter these studies were to be reviewed in order to formulate a comprehensive project report by November–December 1982. The NPG was accordingly strengthened by the GOG on a priority basis. (See Exhibit 5 for the organisational pattern of NPG).

The NPG undertook projectisation of specific studies that were required to be conducted for a multidisciplinary, multi-level planning of the Sardar Sarovar (Narmada) Project. NPG chalked out in consultation with the Irrigation Department of GOG, details of technological and socio-economic studies to be carried out. (For list of studies see Exhibit 5).

The overall frame of studies under the various topics listed above was included in a document “Projectised studies — Sardar Sarovar (Narmada) Project” brought out in September 1981. Based on this projectisation of studies, discussions were held with the Bank Missions so that studies could be properly organised to facilitate the task of project appraisal by the Bank. The actual conduct of studies was contracted to various research organisations (See Exhibit 6). The results of this comprehensive range of studies were incorporated in the Project Report entitled “Sardar Sarovar (Narmada) Development Plan” which was prepared and presented to the Bank in May 1983.

There were in all 15 missions mounted by the Bank for project identification, review and appraisal. Later on, for the project appraisal and post-appraisal periods, 9 Bank Missions visited (See Exhibit 7 for dates and purpose of various missions). The agreements for a gross credit/loan of US \$450 million was signed in Washington on 10th May 1985.

The Prime Minister Rajiv Gandhi gave the Government of India’s approval to the project in late 1987. This clearance, however, was subject to the state government complying with conditions laid down from the environmental angle and approval for the diversion of forest lands.

According to the report of the Narmada Planning Group:

“The Narmada basin development will have a major impact on the economy of the country in general and of Gujarat in particular. The Sardar Sarovar Project (SSP) is expected to bring about an increase in agricultural value added to the tune of Rs. 600 crores annually and

generate directly additional employment equivalent of about 3 lakh full time jobs. The indirect effects of the project would be even larger. The total impact of the project on Net State Domestic Product (Gujarat) is estimated to be of the order of Rs. 1200 to Rs. 1500 crores and the total number of jobs to be generated would exceed 5 lakhs. Since the current state domestic product stands at Rs. 5000 crores, it is obvious that Narmada project would be a major factor influencing the future welfare of the people in the state"¹¹.

Notwithstanding the benefits claimed by the Government, the project has been criticised primarily on three grounds:

- (i) Resettlement of oustees,
- (ii) environmental impact, and
- (iii) economic viability.

RESETTLEMENT OF OUSTEES

The estimates of the number of people likely to be displaced by NVP vary from 300,000 to one million. This will be the largest river basin population displacement to date. (See Exhibit 8 for number of displaced persons from ten major river valley projects). A large proportion of this population belong to tribal communities.

As per the award of the Narmada Water Disputes Tribunal (NWDT), the respective state governments are responsible for settling the oustees. The costs of resettlement are however to be borne by the Narmada project authority. It has also been made mandatory that the oustees would be given a two years' advanced notice before the scheduled date of shifting.

The Government of Gujarat has also set up the Sardar Sarovar Nigam Limited which was entrusted with the responsibility of resettlement of oustees. The compensation package offered by the Nigam includes:

“The grant of agricultural land of the size equal to the land acquired or a milline of two hectares. Sons of landed displaced who had reached the age of 21 would be treated as an independent family and be entitled to two hectares of land. This would also apply in case of joint holders and landless labourers and their major sons. Besides

residential plots of 500 sqm. would be given free to every displaced family. Resettlement grant and grant-in-aid was also payable. Subsistence allowance would be payable at the rate of Rs. 15 for 25 days in a month for one year from the date the oustee commences residing at the new site. The Nigam would provide electricity at all settlement sites and insurance cover to the affected families against personal accident, damage to huts and personal belongings"¹³.

But the implementation of the rehabilitation scheme has posed many problems. The quantity of land required for relocation of oustees is not available either in Gujarat or other adjoining states. Furthermore it would lead to displacement of sharecroppers dependent on the land.

Mr. S.C. Varma, Chairman, Narmada Valley Development Agency, has indicated that:

“Almost all cultivable lands available in the villages were brought under the plough authorisedly or unauthorisedly (*sic*). This has very greatly reduced the possibility of getting any sizeable blocks of land for being allotted to oustees’ families”¹⁴.

He further adds

“The grazing lands that remain in the villages have hardly any soil cover and are of very poor quality, totally unfit for crop production. Even if the percentage of grazing lands is reduced further, it would not help in getting any sizeable area for the purposes of settlement.”

Critics of the government also point out that when construction of the dam is planned resident quarters of the officers and other staff always get priority. According to a report:

“In the Sardar Sarovar Project, Kevada Colony, a well developed residential area with markets, schools, parks and other facilities was kept ready before the staff moved in. On the other hand, when the villagers were served with legal notices for acquisition of lands, no preparation was made for their shift to alternative sites. Even if some sites are located, no effort was made to develop the sites. They were generally left to fend for themselves”¹⁵.

It has also been envisaged that if the oustee is not satisfied with the new sites chosen by the government, he is free to buy suitable agricultural land in any other place of his own choice and cost would be borne by the project authority. But the cash compensation is said to be not adequate and the oustees were not able to buy, with the compensation, land of the same size and quality as that lost due to submergence. A World Bank consultant has also observed: "Cash compensation usually results in lower living standards and reduces quality of life among the large majority of relocatees"¹⁶. As most of the oustees are tribals, "the sudden influx of modern system, destruction of the surrounding nature on which their lives are dependent and, ultimately displacement and resettlement leaves the tradition-bound tribal family totally bewildered, powerless and on the verge of total social, cultural and economic collapse"¹⁷.

Many people displaced from their traditional surroundings drift towards cities, where they are unable to withstand the hardships and deprivations of city life. Since they have already been deprived of their traditional culture and values and stripped of the social support which they earlier enjoyed they fall victims to many afflictions. Men often turn to alcohol and women are forced to prostitute to fend themselves. These evils keep afflicting them through the rest of their lives.

A study by the Tata Institute of Social Sciences indicates that those resettled do not still have 'pucca' houses, and employment. Many have been given land unfit for cultivation. This study also indicates that the death rate among the oustees has increased. Food reserves have fallen, so also has the per capita income. Cattle, earlier a major source of income, is dying¹⁸. The World Bank team which recently visited India to review the progress made in terms of resettlement of oustees of the NVP has shown dissatisfaction over the arrangements made so far for rehabilitation. The current loan instalment ended on 31st March 1989, and the entire situation with regard to resettlement is under review¹⁹.

ENVIRONMENTAL IMPACT

The environmental impact of NVP can be divided into:

(i) impact on ecology, and (ii) impact on health of the people.

IMPACT ON ECOLOGY

This will include ecological loss due to submergence of forests, loss of wildlife, the combined seismic impact of all reservoirs, changes in downstream ecosystem, and the damage due to backwater.

In India 4,79,000 hectares of forest land was lost due to river valley schemes during the year 1970–75. This accounted for about 16 per cent of the total forest land. Since the forest area in the country was at a precariously low level, in 1976 the then Prime Minister issued a circular to all states to pay more attention to forest conservation. But after four years, the Government of India realised that the promises made by the states were not being fulfilled once clearance was given for an irrigation project. This led Parliament to pass the First Conservation Act in 1980 giving wide powers to the Central government. Under the Act, the Union Environment Ministry sent a check list of queries to both Gujarat and Madhya Pradesh to identify alternative sites for the development of forest areas in lieu of the land to be submerged in the NVP. The rehabilitation of the people to be affected by the two projects, alternative sites for wildlife and development of command areas to protect against diseases were some of the points to which the Central government demanded a satisfactory response. In the absence of an appropriate and acceptable scheme to mitigate the environmental impact, the clearance of the project by the ministry of environment was considerably delayed.

The deciduous natural forests cover 32 per cent of the Narmada basin. The Narmada, unlike the snow-fed rivers of the north, depends on forests to collect the rain water. It is one of the most densely forested basins in India. The total forest area to be submerged, according to official sources, is estimated to be 44,321 hectares. This figure does not include an extra 1,260 hectares of forest land required for the construction of canal, staff colonies and related works. It is also feared that the forest land that will escape submergence will come under tremendous pressure from the displaced oustees, their livestock and those wild animals fleeing for safety from submerged areas²⁰. The extent of damage to the forests can be gauged from the following estimates:

“Nearly 2,00,000 cattle now graze in the forest areas of the East Nimar and Dewas districts which will be coming under submergence. Further, the catchment area of Dewas district alone has a population of 4,86,248 cattle. Similar demands on the remaining forests, will come

from the displaced people. Their fuel and other timber needs will have to be met somehow”²¹.

The NVDA has promised to take up compensatory afforestation in an area of 90,000 hectares of degraded forest land. The critics, however, point out that reforestation of degraded forest lands will hardly replace the loss of natural forests. No systematic survey has yet been made of flora and fauna of this region. The inventory of medicinal plants made in the case of SSP indicates that a large number of plant species with medicinal values will be lost. These plants are used for the treatment of a variety of diseases. (See Exhibit 9).

It has also been pointed out that submergence of a large portion of forest lands will adversely affect the wild-life. Although the project planning authorities have planned compensatory reforestation, the absence of forest corridors will make it difficult for wildlife to migrate to alternate habitats and most will simply drown in NVP dams. A preliminary report prepared by the Environment Planning and Co-ordination Organisation (EPCO), Madhya Pradesh indicates that:

“suitability of the area as a wildlife feeding and breeding habitat may be affected by massive deforestation. Even compensating afforestation till such time as a complete ecosystem including ground flora and different storeys of trees is developed may not be a helpful alternative”²².

The report further adds:

“Ecological pressures and micro-climatic changes caused by deforestation and vegetationally exposed migration routes will inevitably threaten wildlife.”

According to the Narmada Project Authority reports 55,681 hectares of fertile land will be submerged. One critic of the project has observed:

“The dry and barren land which will receive water from the dams at the cost of the fertile land which has gone under water forever will not be as fertile as the land lost under the dams and canals and the crops grown on such land will never be able to compensate for the crops lost from such fertile, but now underwater land”²³.

The Narmada basin is classified as a zone of moderate seismicity, with infrequent occurrence of earthquakes.

The danger of earthquakes is evident from the results of scientific research conducted at several large reservoirs. These researches reveal that:

“The possibilities of earthquakes being triggered due to the impounding of massive amount of water in them: seismic tremors have been recorded at these reservoirs. Earthquake can also occur due to the existence of active faults, or discontinuities in the underground rocks, along with movement that may take place, or due to the existence of fissures through which water, seepage into the earth”²⁴.

The NVP, it is pointed out by the critics is likely to cause large scale siltation, water logging and salinity. The Narmada Planning Group has planned environmental training programmes for senior level project administrators like secretaries and chief engineers, and for middle level project officers like superintending engineers, directors etc. The environmental impact of the project and their solutions will be discussed in these training programmes through specially prepared case studies²⁵.

HEALTH IMPACT

The building of irrigation dams increases the incidence of some diseases. The relationship between irrigation and malaria is well known. A study was carried out in comparable villages in Meerut district of Uttar Pradesh (UP) state and Gurgaon district of Haryana state in India. In Meerut the villages were within 2 kms of irrigation canal, while in Gurgaon district they were 40 kms away. The villages in Meerut district which were in close proximity of canals were found to have six times more malaria cases in the month of June and nine times in October as compared to villages in Gurgaon district which were away from canals²⁶. Similarly the results from a study in Tamil Nadu revealed that more than half the malaria cases in the entire rural Tamil Nadu were found in the villages along the coast of South Ponnaiyar river which passes through three districts Salem, Dharmapuri and North Arcot. The villages within 5 kms of the river which were free from malaria for 20 years, have now been found to have heaviest concentration of malaria. It has also been reported that in the whole of Terai region high densities of mosquitoes can be found and this has caused many viral diseases including Japanese Encephalitis. Available information from a number of other hydro-

electric river valley projects in India also indicate that these projects have increased the mosquito breeding potential thereby causing malaria. The reports about the relationship between irrigation and malaria are not of recent origin. The Malaria Institute of India even in 1940's had pointed out that perennial irrigation projects in Punjab, Uttar Pradesh and Sind provided additional breeding grounds for mosquitoes resulting in increased incidence of malaria²⁷.

Irrigated areas also attract a large number of immigrant labourers who bring malaria cases into the region. Their poor working and housing conditions further increase the risk of malaria. A working paper prepared by the Madhya Pradesh Council of Science and Technology indicates that the incidence of malaria, filariasis, cholera, gastroenteritis, goitre and some other water-borne diseases is likely to increase as a result of Narmada Sagar Dam²⁸. To assess the impact of the project on health profile of the population residing in Gujarat portion of the catchment area of the river above the Navagam dam site and downstream of Navagam dam site, the Narmada Planning Group (NPG) entrusted a study to the Department of Botany of M.S. University, Baroda. Information regarding the incidence of various diseases was collected for the areas downstream and upstream of the dam site in Gujarat state. The analysis of the disease profile in the command area shows that the three important diseases which would require surveillance, monitoring and control measures are: malaria, schistosomiasis, and filaria. Studies have also shown that:

“The construction of large reservoirs can result in the elevation of subsoil water in the vicinity, with consequent changes in the levels of fluoride, calcium, trace metals etc., in soil sediments. This in turn results in the emergence of diseases, such as fluorosis, in people who are forced to use the contaminated water. For instance, National Institute of Nutrition, Hyderabad has conclusively revealed the seriousness of fluorosis in areas adjacent to the Nagarjuna Sagar Dam. Skin infection, trachoma, guinea-worm and schistosomiasis are other diseases transmitted by water. The price for the lack of recognition and control of these environment-related diseases is paid, not only in terms of human health, but also in terms of the costs of pest control and medical care”²⁹.

In the Nagarjuna Sagar Dam area in the neighbouring state of

Andhra Pradesh, the sub-soil environmental changes caused by the construction of the dam have triggered off causative factors resulting ultimately in a crippling syndrome of knock-knees (*genu valgum*) among the poverty stricken villages living in the command area of the dam. According to a report:

“*Genu valgum* can be identified in the people there, both in standing position and when they walk. In extreme cases, the legs are so distorted that the knee joints cross over. In some others in the standing position the two feet are separated by over a yard while knees touch each other. In other cases an S-shaped deformity of legs has resulted in a total incapacity to move”³⁰.

The disease, apart from physical handicaps, has caused serious emotional disturbances and social stress. The cases of knock-knees syndrome have also been found in the newly irrigated areas of Karnataka and Tamil Nadu³⁰. More than 3000 construction workers are involved in building the dam and irrigation system. Majority of these workers are from Andhra Pradesh, Bihar, Rajasthan and Uttar Pradesh and live on the project without their families. It has been pointed out that apart from sexually transmitted diseases, these workers introduce other diseases previously not prevalent in the area. In addition, these workers are also susceptible to locally endemic diseases.

The Narmada Planning Group has prepared the work plan for the health sector with the following objectives:

- “(a) To provide for systematic and continuous monitoring of health profile of the project area and
- (b) To provide for suitable infrastructure facilities to take care of preventive and curative measures required for disease control in the project area”³².

The work plan will cover the following two sectors:

- (i) Surveillance and control of water related and communicable diseases; and
- (ii) surveillance and control of malaria.

A suggestion has been made in the work plan that the activities proposed should be ‘interwoven’ with those of the health department to avoid duplication. Therefore, the plan does not include a scheme

of monitoring of health profile of the project area as it is already included in the seventh plan (health sector) of the state government. Similarly the plan for surveillance and control of malaria, only proposes to strengthen the state organisation under the National Malaria Eradication Programme (NMEP). For the surveillance and control of water related and communicable diseases, the plan includes:

- (i) A 25-bedded hospital at the project site;
- (ii) Strengthening of laboratory services; and
- (iii) Provision of laboratory technicians in the existing Primary Health Centres (PHCs) in the command area.

The total outlay proposed for health-related activities over the entire 17 years' duration of the project works out to be Rs. 38 crores.

ECONOMIC VIABILITY

The Narmada Valley Project (NVP) includes the construction of two large dams — Sardar Sarovar in Gujarat and Narmada Sagar in Madhya Pradesh. In addition, the scheme envisages 28 other major, 135 medium and 3000 small dams on the Narmada river along its course over the two states. It is estimated that the project will irrigate eight million acre feet of land, bring 3500 million litres of drinking water in 131 towns and cities and 4,700 villages³³. The project will also generate 1450 MW of power through hydro-generation which will be shared by Madhya Pradesh, Maharashtra and Gujarat. The water from the reservoir would start flowing to Baroda and Bharauch districts by 1994–95, while the entire project would be completed in 17 years³⁴. The total cost of the NVP is estimated to be Rs. 25,000 crores of which approximately half will be spent on Sardar Sarovar Project (SSP) in Gujarat. The project costs have since escalated many fold. For example the SSP was estimated to cost Rs. 1,500 crores in 1964–65, 2,100 crores in 1979, 6,000 crores when it was cleared by World Bank in 1984 and the latest estimated cost is Rs. 13,000 crores³⁵. According to the guidelines specified by the Planning Commission, the benefit–cost ratio of irrigation projects must be 1:1.5, that is, for every rupee spent there must be a return of Rs. 1.50. In the 1982 detailed Project Report of NVP, the benefit–cost ratio was shown as 1:1.88. In another official document of 1984 the benefit–cost ratio is given as 1:1.74. In the calculation given in the appendix of this document, the cost–benefit ratio works out to be 1:1.52³⁶.

A study of NVP, conducted by a non-governmental organisation 'Kalpavriksh' claims that in making cost-benefit calculations, costs have been minimised and benefits maximised. The report points out:

"Since the dams involve a colossal expenditure from the public exchequer, they require thorough analysis of their various costs and benefits. However, even a brief look at the existing cost-benefit analysis shows that the benefits have been greatly exaggerated while many costs underestimated or not computed at all"³⁷.

The antagonists of the project also believe that environmental costs have not been taken into consideration, while arriving at cost-benefit ratios³⁸. According to the estimates of the Department of Environment and Forests, Government of India, the environmental cost of loss of forests will be Rs. 30,923 crores for NSP and Rs. 8,190 crores for SSP³⁹. If these environmental costs are included then the cost-benefit ratio of NSP and SSP, according to one estimate, will be reduced to 1:0.017 and 1:0.24 respectively⁴⁰. Suggestions have also been made that while judging the economic viability of these projects psychic, social and financial costs of the oustees should also be taken into account⁴¹.

Ecologists and experts, however, point out that:

"If the height of the Sardar Sarovar is reduced from 455 feet to 420 feet, 90 per cent of the people are saved from displacement and 80 per cent of the land is saved"⁴².

Critics also 'question' the desirability of more irrigation projects and suggest that current water shortages could be alleviated by full and efficient utilisation of already existing irrigation potential. In support of their suggestions, they quote the Planning Commission Seventh Plan document wherein it is indicated that emphasis in irrigation planning must move away from setting up more major projects to better management of existing ones. Till 1984-85, the state of Gujarat had not utilised about 58 per cent of its irrigation potential. This figure for Madhya Pradesh is 70 per cent⁴³. Other alternatives suggested are lift irrigation and small scale reservoirs⁴⁴.

Out of four large dams proposed to be built on Narmada river, only Sardar Sarovar Project (SSP) of Gujarat has so far been cleared by the Planning Commission. This too is in the initial stages of implementation. Critics suggest that all alternatives, as indicated above, should be thoroughly reviewed by the Planning Commission,

and the Ministry of Environment and Forests, Government of India, in terms of economic viability and long and short range environmental effects, before such large scale irrigation projects are accorded requisite approvals.

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EXHIBIT 1

India's Highest Dams — Basic Information

<i>Name of Dam</i>	<i>River / State</i>	<i>Gross Capacity of Reservoir (mil.cu m)</i>	<i>Height length (m)</i>	<i>Purpose (a)</i>
Tehri (b)	Bhagirathi/UP	3,539	261/570	IH
Kishau (b)	Tons/UP	2,400	253/360	IH
Bhakra	Satluj/HP	9,621	226/518	IH
Lakhwar (c)	Yamuna/UP	580	192/440	IH
Idukki	Periyar/Kerala	1,996	169/366	HC
Srisaillam(b)	Krishna/AP	8,722	143/512	H
Cheruthoni	Cheruthoni/ Kerala	1,996	138/650	HC
Sardar Sarovar	Narmada/ Gujarat	9,492	137/1210	IHC
Pong	Beas/HP	8,570	133/1950	IH
Silent valley(b)	Kunthipuzha/ Kerala	317	131/430	H

NOTE:

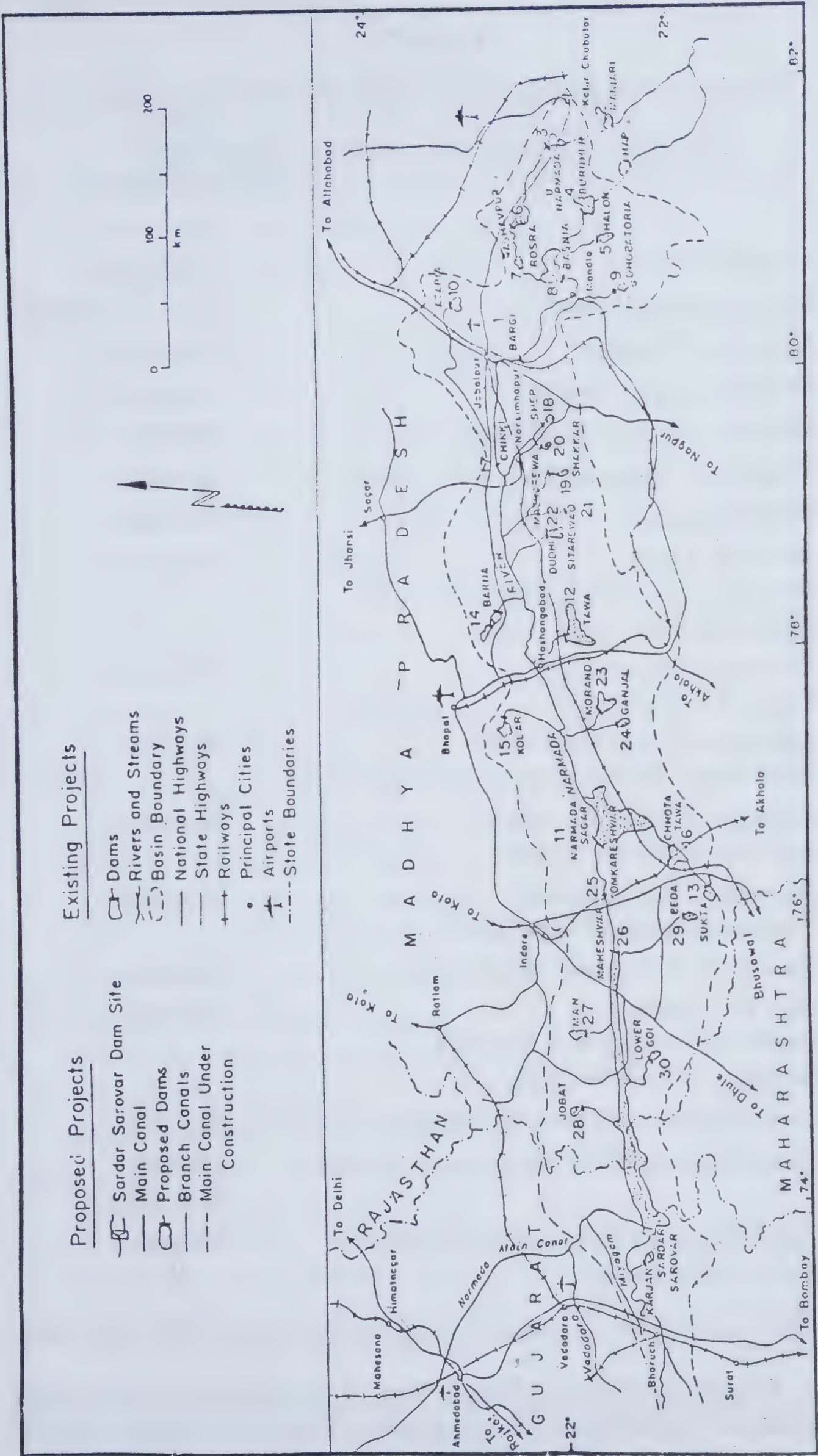
(a) I: Irrigation; H: Hydroelectric power; C: Flood control

(b) Under construction

(c) Seventh Plan

Source: Register of large dams in India, Central Board of Irrigation and Power, New Delhi.

EXHIBIT 2



Courtesy: World Bank

Major Projects in the Narmada Basin

Source: Damming in Narmada¹⁴

EXHIBIT 3

Composition of Narmada High Power Committee

(Government Resolution Irrigation Department
No. NPC/1078-27-375-K-8, dt. 18-12-1981 in Gujarat)

1. Chief Minister	Chairman
2. Minister, Irrigation	Vice-Chairman
3. Minister, Finance	Member
4. Minister, Agriculture	Member
5. Minister of State Irrigation	Member
6. Chairman, Gujarat Electricity Board	Member
7. Chief Secretary	Member
8. Dr. Y.K. Alagh, Executive Vice-Chairman, Narmada Planning Group	Member
9. Principal Secretary, Finance Department	Member
10. Additional Chief Secretary Industries, Mines and Power Department	Member
11. Additional Chief Secretary, Agriculture Department	Member
12. Secretary, Building and Communications Department	Member
13. Secretary, Irrigation Department	Member
14. Shri B.J. Desai, Special Secretary & Financial Adviser, Irrigation Dept.	Member
15. Chief Engineer (Narmada) & Joint Secretary	Member
16. Chief Engineer(NPCM) & Joint Secretary	Member- Secretary
17. Chief Engineer (Narmada Designs) & Joint Secretary	Member

Source: Narmada Planning Group Report, Gandhinagar, Narmada Development Department, Government of Gujarat, October 1985.

EXHIBIT 4

Composition of Narmada Planning Group

(Government Resolution Irrigation Department
No. NPM-1080 / 649 / Ident / 99 / 194-K-9, Dt. 7th April, 1981 and
No. NPM-1080 / 649 / Ident / 99 / 194-K-9, Dt. 16th July, 1981)

- | | |
|---|--------------------------------|
| 1. Minister (Irrigation) | Chairman |
| 2. Dr. Y.K. Alagh,
Director, Sardar Patel Institute of
Economic & Social Research, Ahmedabad | Executive
Vice-
Chairman |
| 3. Minister (Finance & Planning) | Member |
| 4. Chief Secretary | Member |
| 5. Principal Secretary, Finance Department | Member |
| 6. Additional Chief Secretary,
Industries, Mines & Power Department | Member |
| 7. Additional Chief Secretary,
Agriculture Department | Member |
| 8. Secretary, Irrigation Department | Member |
| 9. Special Secretary (Planning)
General Admn. Department | Member |
| 10. Special Secretary & Financial
Advisor — Narmada Project | Member |
| 11. Secretary, Panchayat, Housing
& Urban Development Dept. | Member |
| 12. Chairman, Gujarat Electricity Board | Member |
| 13. Upto 5 Nos. full time members
(To be appointed separately) | |
| 14. Shri B.R. Deolalikar,
Member, State Planning Board | Part-time
Member |
| 15. Dr. S.S. Mehta
Director, Perspective Planning
& Joint Secretary, General
Administration Department | Member |
| 16. A permanent Government Officer
of the grade of Chief Engineer
and Joint secretary | Member-
Secretary |

Source: Narmada Planning Group Report, Gandhinagar, Narmada Development Department, Government of Gujarat, October 1985.

EXHIBIT 5

**List of Studies Proposed in Draft Work Plan
(1983-86) of NPC**

<i>Sl. No.</i>	<i>Topic</i>
<hr/>	
A. Planning Studies:	
1.	Regional planning for Narmada command area
2.	Water shed management in the catchment area of Sardar Sarovar Project in Gujarat
3.	Planning for afforestation in the command area of Sardar Sarovar Project and catchment area in Gujarat
4.	Bhal Area:
	i) Irrigation and drainage
	ii) Agriculture
5.	Environmental impact analysis for the command area of Sardar Sarovar (Narmada) Project
6.	Identification of demand locations for non-agricultural use from Sardar Sarovar Project
7.	Techno-economic feasibility for development of micro-hydel power generation at drops along the branches
8.	Energy balance study
9.	Management information system
10.	Utilising treated effluents for irrigation
11.	Organisation structure
12.	Manpower requirements and training programmes
13.	Data storage, retrieval and analysis system
14.	Further studies on planning options in terms of storage possibilities and use of surplus water
15.	Survey of water rates policy, cost recovery and organisation
16.	Streamlining land acquisition procedures for major projects

B. Reservoir — Canal Operation Studies:

1. Overall model integrating water accounting, irrigation scheduling, canal operation and hydro power generation with reservoir operation (Sardar Sarovar) (farm to reservoir)
2. Integration of micro level irrigation schedules with canal operation
3. Irrigation scheduling and water accounting framework
4. Plan of communication

C. Main Canal Studies:

1. Transients in main canal and branch canals utilising single pool and multi-pool models and operational plan integrating transients

D. Studies for Branches:

1. Feasibility study of power generation potential and pumping installation on Kachchh branch canal

E. Distribution System Studies:

1. Layout and operation of village level delivery systems under different agro-climatic conditions
2. Design of delivery network for problem areas in Sardar Sarovar Project command
3. Computer based distribution network layouts
4. Land use maps with details regarding crops for regions 7 and 11 of the SSP command

F. Groundwater Studies:

1. Groundwater investigations in Sardar Sarovar Project command
2. Mathematical modelling of groundwater system for Shedhi-Sabarmati doab
3. Conjunctive use strategy for agency ground water utilisation for the purpose of irrigation

4. Regional level ground water potential and pumping requirements for irrigation and drainage in SSP command

G. Drainage Studies:

1. Detailed drainage network in Sardar Sarovar Project command between Narmada and Mahi
2. Pre-feasibility level drainage study for Sardar Sarovar Project command beyond Mahi River

H. Soil Survey Studies:

1. Soil survey studies for Narmada–Mahi doab Phase-I

I. Agriculture Studies:

1. Possibilities of new agricultural crops
2. Determination of crop water requirements, comparison of climatic approach *vis-a-vis* actuals (a review)
3. Estimation of field application and field operation losses
4. Crop water requirements, crop calendar and critical stages of crop growth
5. Irrigation management studies on miscellaneous problems like organisation at village level
6. Agricultural information system and monitoring model.

EXHIBIT 6

List of Consulting Institutions/Firms to whom Study Assignments were given by Narmada Planning Group

(A) Government and University Departments/Educational and Research Institutions:

- | | |
|---|--------------------|
| 1. Agro-Economic Research Centre and Department of Economics, Sardar Patel University | Vallabh Vidyanagar |
| 2. Bhavnagar University (Department of Economics) | Bhavnagar |
| 3. Bureau of Economics and Statistics | Gandhinagar |
| 4. Centre for Environmental Planning and Technology | Ahmedabad |
| 5. Director of Agriculture | Ahmedabad |
| 6. Gujarat Institute of Area Planning | Ahmedabad |
| 7. Gujarat Rural Development Corporation | Gandhinagar |
| 8. Gujarat University (Department of Geography) | Ahmedabad |
| 9. Gujarat University (Department of Sociology) | Ahmedabad |
| 10. Gujarat Water Resources Development Corporation | Gandhinagar |
| 11. Gujarat Water Supply and Sewerage Board | Gandhinagar |
| 12. Indian Council of Applied Manpower Research | Delhi |
| 13. Indian Institute of Management | Ahmedabad |
| 14. Indian Institute of Management (Dr. Anil Bhatt) | Ahmedabad |
| 15. Institute of Cultural and Urban Anthropology | Ahmedabad |
| 16. M.S. University (Department of Botany) | Vadodara |
| 17. M.S. University (Department of Geography) | Vadodara |
| 18. Sardar Patel Institute of Economic and Social Research | Ahmedabad |
| 19. Saurashtra University (Department of Economics) | Rajkot |

- | | |
|---|-------|
| 20. South Gujarat University
(Centre for Social Studies) | Surat |
|---|-------|

(B) Private Consultants/Organisations:

- | | |
|---------------------------------------|-----------|
| 1. Core Consultants (Pvt.) Ltd. | Ahmedabad |
| 2. Dalal Consultants (Pvt.) Ltd. | Ahmedabad |
| 3. Jyoti Consultants Ltd. | Vadodara |
| 4. Premier Consultants | Bombay |
| 5. Operations Research Group | Vadodara |
| 6. Dr. C.R. Shah | Vadodara |
| 7. Tata Consultancy Services | Bombay |
| 8. Tata Economic Consultancy Services | Bombay |
-

Source: Narmada Planning Group Report, Gandhinagar, Narmada Development Department, Government of Gujarat, October, 1985.

EXHIBIT 7

Duration and Purpose of Various World Bank Missions

<i>Sl. No.</i>	<i>Duration of visit</i>	<i>Main purpose of mission</i>
(A) Identification and Review Missions:		
1.	Aug 4–27, 1980	Discussions on Identification report
2.	Sep 15–19, 1980	Design of dam
3.	Oct 6–10, 1980	Geological studies for dam
4.	Nov 4–12, 1980	Ground water modelling
5.	Feb 12–14, 1981	Geology of foundation for dam
6.	Feb 17–20, 1981	Studies required for project formulation
7.	Feb 17–22, 1981	Ground water modelling; Automatic canal operation; studies relating to Bhal area
8.	May 20–29, 1981	Specifications for pre-cooled concrete for dam
9.	May 25–26, 1981	Canal operation studies
10.	June 10–20, 1981	Studies for project formulation
11.	Aug 26–Sep 11, 1981	Design and operation of main canal
(B) Pre-Appraisal Missions:		
12.	Nov 4–10, 1981	Review of technological and socio-economic studies requi- red for projects appraisal Discussions relating to hydropower component
13.	May 27–June 9, 1982	Review of technological and socio-economic studies required for project appraisal

- | | | |
|-----|----------------|---|
| 14. | Sep 7–22, 1982 | Review of technological and socio-economic studies required for project appraisal |
| 15. | Dec 9–18, 1982 | Review of technological and socio-economic studies required for project appraisal |

(C) Appraisal Missions:

- | | | |
|-----|---------------------|---|
| 16. | Feb 28–Mar 17, 1983 | Discussions on draft project report on Sardar Sarovar (Narmada) Development Plan |
| 17. | May 10–21, 1983 | Appraisal of Sardar Sarovar (Narmada) Development Plan |
| 18. | Jun 3, 1983 | Review of hydro-electric component |
| 19. | Sep 26–Oct 6, 1983 | Appraisal of Sardar Sarovar (Narmada) Development Plan |
| 20. | Nov 14–16, 1983 | Appraisal of environmental component of Sardar Sarovar (Narmada) Development Plan |

(D) Post-Appraisal Missions:

- | | | |
|-----|-----------------|---|
| 21. | Dec 12–13, 1983 | Prequalification documents |
| 22. | Aug 6–22, 1984 | Review of rehabilitation plans, legal aspects, design and operation of main canal and branch canals |
| 23. | Sep 24–26, 1984 | Review of cost estimates and prequalification documents |
| 24. | Mar 11–21, 1985 | Technical aspects of bid packages for main canal and Miyagam branch canal. |

Source: Narmada Planning Group Report, Gandhinagar, Narmada Development Department, Government of Gujarat, October 1985.

EXHIBIT 8

**Total Number of Displaced Persons from Ten Major
River Valley Projects in the Country**

<i>Name of the project</i>	<i>Estimated number of displaced</i>
Bhakra	3,000
Ganga valley	3,00,000
Nagarjuna Sagar	25,000
Pochampad	1,20,000
Polavaram	30,000
Pong	1,00,000
Srisaïlam	80,000
Tehri	70,000
Ukai	55,000
Total	<hr/> 8,10,000 <hr/>

Source: Rehabilitation — The Economic and Social Costs by Kashyap Mamrodi and Tanushree Gangopadhadhya, Centre for Social Studies, University Campus, Surat.

EXHIBIT 9

**Plant Species with Medicinal Value Present in the
Proposed Submergence Region of Sardar Sarovar Project**

<i>Family and Name</i>	<i>Uses</i>
LILIACEAE Gloriosa Superba Asparagus racemosus	Fracture healer General tonic, Feminine—MC disorders, cough, Buccal cavity ulcers
LYTHRACEAE Rotala serpyllifolia (Roth) Bremek	Alimentary Canal disorders
MALVACEAE Thespesia lampas (av.) Dalzell	Reproductive disorders
MELIACEAE AZADIRACHTA INDICA	Leafy paste or decoction applied on skin abscess and other dermal infections, Fabrifuge, anthelmintic
MENISPERMACEAE Cocculus hirstus (L.) Diels	Coolant, tonic, infantile diseases
MEMOSACEAE Acacia Chundra	Bark used medicinally as disinfectant for skin diseases
MORACEAE Ficus benghalensis L. Ficus racemosa L	Reproductive disorders Reproductive disorders

<i>Family and Name</i>	<i>Uses</i>
RUTACEAE <i>Aegle marmelos</i> (L)Corr.	Lead extra (liver stimulant used in jaundice) Unripe fruits used for diarrhoea, pickled Ripe fruits used as mild purgative
NYCTAGINACEAE <i>Boerhavia diffusa</i> L	Used as Diuretic and general tonic
AMARANTHACEAE <i>Achyranthes aspera</i> L. Var. <i>aspera</i>	An appetite killer
PAPILIONACEAE <i>Arbus precatorius</i> L	Leaves sweet; used on sore throat — a local licorice. Seed Coat poisonous. Kernel used medicinally as a general tonic and diuretic
<i>Aeschynomene indica</i> L	Skin diseases
<i>Butea monosperma</i>	Seeds highly purgative (EA), Gum used medicinally as eye drops (A), Leaves used for making containers, Tree good for Lac insect Rearing, Flowers diuretic, coolant used in sunstroke
<i>Clitorea ternatea</i>	Oral application on Leucoderma or skin patches (E)

<i>Family and Name</i>	<i>Uses</i>
Desmodium gangeticum	Cough and bronchial troubles (E) Cardiac stimulant (E)
PAPILIONACEAE Mucuna puereria	Seed—Kernels aphrodisiac, tonic
Rhynchosia minima (L) DC. Var.	Alimentary Canal disorders
Tephrosia purpurea L	Alimentary Canal disorders
Teramnus labialis(L.f) Spreng	Alimentary Canal disorders
RHAMNACEAE Ziziphus mauritiana Lam	Skin diseases
RUBIACEAE Catunaregum spinosa (Thunb) Tiruvengadum	Respiratory ailments
TILIACEAE Triumfetta rotundi folia Lam. Corchorus olitorius L	Skin diseases Infantile disorders
VERBENACEAE Tetona grandis L.f.	Purgative, diuretic
VITACEAE Ampelocissus latifolia	Indigestion — decoction is recommended

<i>Family and Name</i>	<i>Uses</i>
ANACARDIACEAE Semecarpus anacardium	Healing severe fractures (E.A), For skin blisters (E)
ANACARDIACEAE Duchanania lanzon spreng	Respiratory ailment
APOCYNACEAE Holarrhena antidysenterica	Seed-power anthelmintic, als used on piles, to be taken with Buttermilk, skin disease
Wrightia arborea (Dennst.)Mabberly	Alimentary Canal disorders
Wrightia tinctoria R.Br.	Reproductive disorders
ARACEAE Sauromatum pedatum (Willd. Schott).	Skin diseases
ASCLEPIADACEAE Calotropis gigantea	Latex swallowed with sugar or flour, relieves Bronchial Congestion (E.A). Smoke on anus cures piles (E) Latex used as eardrops to relieve ear-ache (E)
Calotropis procera (Ait)R.Br.	Cough and bronchial ailments, smoke on piles, reproductive disorders
Marsdenia tenacissima (Roxb.) Moon	Reproductive disorders

<i>Family and Name</i>	<i>Uses</i>
Hemidesmus indicus (L) Schult	Infantile diseases
ASTERACEAE Launae procumbens (Roxb)	(Ramayya and Rajagopal)
Xanthium strumarium L	Skin diseases
BOMBACACEAE Calmalia malabarica	Prickle-paste used on pimples and abscess, flowers used as vegetables, Aril used as filling fibre.
CAESALPINIACEAE Cassia absus	Skin diseases
COMBRETACEAE Terminalia arjuna	Bark is medicinally useful. Coagulant stops bleeding, cardiotonic, anti-inflammatory, Diuretic, Healing of ulcers
CUCURBITACEAE Coccinia hirsustus	Digestive disorders
Trichosanthes Cucumerina L	Infantile disorders
DIOSCORIACEAE Dioscorea hispida Dennst	Digestive system disorder

The Narmada Valley Project

Family and Name

Uses

ELATINACEAE

Bergia suffruticosa
(Del.) Fenzl.

Reproductive disorders

Source: Cost of Submergence — A study of Sardar Sarovar Project by
Das and Charan, CSS, Surat, March 1983.

AGRICULTURAL POLICIES AND THEIR IMPACT ON HEALTH: THE CASE OF SRI LANKA

THE AGRICULTURAL SECTOR IN SRI LANKA — AN OVERVIEW

Agricultural Policies and the products and processes of agriculture are important determinants of the people's health in both developing and developed countries. In developing countries, however, unlike in developed countries, the health status of the majority of the population is closely linked with agriculture for it is on the performance of this sector that their incomes and well-being depend. Nevertheless, it is true that in general, agricultural policy-making does not take into account the health implications of agricultural policies and programmes.

The policies in the agricultural sector are primarily concerned with sectoral goals specific to agriculture. These normally include agricultural productivity and output of the various crops, diversification, production for import substitution and exports and food self-reliance. The outcomes of these policies have far reaching consequences for the health and nutritional status of the population through their effects on the income and purchasing power of the agricultural workforce, the availability of food and the movement of prices. Yet, the analysis of the agricultural policies at this level for their possible outcomes on health is seldom undertaken by national and sectoral planning agencies. However, agricultural planners may often collaborate with the health sector to alleviate or mitigate clearly identifiable and visible

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health risks which impede or retard agricultural growth. The joint effort of these two sectors to combat the spread of malaria in Sri Lanka for the development of the dry zone is a striking example. There is little evidence of similar collaboration to uncover health risks which do not have the same direct impact on agriculture even though they could lead to negative feedback on agricultural productivity and output. The uncontrolled use of pesticides and weedicides in Sri Lanka which has caused serious health hazards to agricultural workers and farming families is an example.

STRUCTURE, PRIORITIES AND SOCIO-ECONOMIC CHARACTERISTICS

Agriculture in Sri Lanka, including forestry and fishing, contributed approximately 26.3% of GDP in 1988. It employs about 45% of the total workforce. The composition of agricultural output in terms of value added is given below:

<i>Sector</i>	<i>1988 Rs. (Million)</i>
<hr/>	
1. Agriculture, Forestry and Fishing	53,600
1.1 Agriculture	45,557
1.1.1 Tea	6,478
1.1.2 Rubber	1,619
1.1.3 Coconut	5,021
1.1.4 Paddy	9,420
1.1.5 Other	23,019
1.2 Forestry	4,006
1.3 Fishing	4,037

Source : Annual Report, Central Bank of Sri Lanka, 1988.

As it is seen from this table, the agricultural sector in Sri Lanka contains two components which are more or less clearly distinguishable, with different agro-climatic characteristics and structures of production. The tree crop sector comprises one component. It includes

tea, rubber, coconut and other minor export crops such as cloves, cinnamon, cardamom, which are Sri Lanka's export earnings. This export-oriented agriculture is mainly confined to the wet zone. The major part is organised in relatively large land holdings, employing wage labour. The other component consists of seasonal crops, mostly food crops which are produced for domestic consumption, in small holdings with a large proportion of owner cultivators. The landlord and tenancy arrangements which are a common feature of traditional peasant agriculture in developing countries also form part of the structure of ownership in the paddy sector in Sri Lanka. It is, however, the smaller part and is regulated by legislation which has attempted to safeguard the benefits of tenant farmers. The most productive part of peasant small holding agriculture based on seasonal food crops is located in the dry zone and depends on irrigation.

Priorities

Agriculture continues to be the major commodity producing sector in the economy. The national plans project a growth rate of approximately 4 per cent per annum for agricultural output during the five-year period 1988 to 1992. The specific goals of agriculture have been identified as follows:

- (i) "Optimum production of basic food items — rice, milk, sugar, fish and pulses — in order to achieve a high degree of self-reliance of supply thereby providing greater security and improving the nutritional status of the population;
- (ii) Expansion and diversification of agricultural export earnings;
- (iii) Increasing income levels and employment opportunities in rural areas."

The total government capital investment in agriculture and the allocation for the various sub-sectors and programmes for the period 1988 to 1992 is given below. Agricultural investments absorb approximately 27% of the total national investment of the government.

**The Government Investment Programme in the Agriculture
Sector for the period 1988 – 1992**

(Rs. Million)

	<i>Ongoing</i>
Total Government investment	132,786
Agriculture	37,458
(a) Mahaweli	21,800
(b) Other Irrigation	4,854
(c) Forestry	556
(d) Lands	1,913
(e) Field and Minor crops	3,433
(f) Livestock	488
(g) Fisheries	1,238
(h) Plantation	3,176

New Projects

Total Government Investment	7,562
Agriculture	619
(a) Mahaweli	—
(b) Other Irrigation	—
(c) Field and Minor crops	293
(d) Forestry and Lands	90
(e) Plantations	—
(f) Animal husbandry	—
(g) Fisheries	236

Source: Public Investment — National Planning Division Ministry of Finance and Planning — May 1988.

Some Socio-economic Characteristics

The agro-climatic as well as socio-economic characteristics of the agricultural sector in Sri Lanka are important for the purpose of identifying the linkages between agriculture and health. Recent

socio-economic surveys reveal that nearly a quarter of the households in Sri Lanka live in conditions which can be characterised as absolute poverty below the level at which the minimum basic needs can be satisfied. The major share of this segment is in the rural sector, either obtaining their livelihoods directly from agricultural or agriculture-linked economic activities. In the tree crop sector the *casual workers* who are dependent on seasonal employment in the plantations suffer from fluctuations of income which lead to periodic shortages of food in their plantations. The health status and levels of literacy of the *resident workforce* of Indian descent are significantly lower than the national averages. In the tree crop sector which is subject to price fluctuations in the international market, the *small-holders* such as those cultivating cinnamon have been specially vulnerable.

In the peasant small-holding sector, which produces only food crops, a large part of the population is exposed to intermittent droughts, consequent crop failures and wide seasonal variations in their income flow. The households in poverty are to be found among the *landless* labourers, the owners of *fragmented holdings* and cultivators *without access to adequate or regular supply of water*. The impact of policies and programmes on the income and living conditions of these vulnerable segments of the population living on agriculture will have direct consequences on their health and nutrition. In the case of each of these segments who are at "risk" it would be possible to identify the relevant agricultural policies and programmes or, in their absence, to articulate the need for them.

DIRECT LINKS BETWEEN AGRICULTURAL OUTCOMES AND HEALTH OUTCOMES

THE MAIN LINKAGES

The main linkages between agriculture and health are to be found in:

- (a) the contribution of agriculture to the increase in productivity and incomes in general and the alleviation of poverty in particular;
- (b) the increase in the output of food and the impact of agriculture on food availability and food prices;
- (c) the changes in technology and its effects on the health of agricultural workers, farm households and consumers of agricultural products.

The nature of each of these links and the way in which they impact on health depend on the mix of agriculture and the structures of production which are specific to a given country. In certain national contexts, the agricultural strategy which is aimed at food, self-reliance may benefit a large segment of small producers to improve their living conditions and promote their well-being. Such was the case in Sri Lanka. In others where food produced by small-scale cultivators is being exported, diversification for export may be the strategy which improves the incomes in this segment. A relevant example is Thailand. Policies for increasing agricultural output in a situation where land-ownership is highly unequal may result in the further impoverishment of the low income small-holders as has happened with the introduction of high yielding varieties in several countries.

The impact of agricultural policies on incomes may have numerous ramifications all of which may eventually affect the purchasing power of households favourably or adversely and by this means, their food consumption and health-related expenditures. An attempt to trace these ramifications for the entire population at different income levels is a very time consuming task which should cover a vast range of income effects of widely varying significance. No doubt it is possible to capture most of these effects through an appropriate model using such techniques as social accounting matrices. However, for the purpose of this exercise it is sufficient if the impact is examined on a more selective basis in terms of the poorest income deciles in a country. The agriculture-linked population, which is living below the poverty line defined for the country, is the appropriate group which has to be considered for the likely impact of agricultural policies on household incomes. It is this group which is at the margin and exposed to the health hazards of poverty through inadequate food consumption, poor housing and sanitation and low levels of literacy. Significant increases in the incomes of these groups will translate themselves directly into an improvement in nutritional status and health.

The second linkages relates to a set of policies which range from the priority assigned to food production to the policies and programmes pursued to maintain an adequate supply of food to the population at reasonable prices. In most countries given the capacity for food production, these policies are closely interlinked as has been demonstrated in the case of Sri Lanka. The task of reconciling the

interests of the producer for the purpose of food self-sufficiency with the interests of consumers presents problems which are of a particularly complex nature. Sri Lanka has attempted to balance guaranteed pricing schemes and massive transfers of resources to food production at one end with food subsidies and state control of the major food items at the other.

The third linkage relating to technological change contains the most readily identifiable impacts on health. These include the impact of major irrigation schemes on the spread of certain diseases such as malaria, diarrhoea, schistosomiasis, the health hazards of pesticides and weedicides, the occupational risks of mechanisation. These may have a differential impact on the genders. It has to be noted that technological changes in agriculture can have both positive and negative outcomes in health. Agricultural technology has produced dramatic improvements in the productivity and quality of staple foods. In certain contexts, it can concentrate on increasing output of the staples of the poor — the cheaper starchy foods and coarse grains. It can improve the nutrient quality. The technological changes also help to reduce the input of human energy in highly arduous manual operations and make the agricultural occupation less onerous and more healthy.

THE DISAGGREGATION OF HEALTH-RELATED COMPONENTS

Exhibit 1 attempts to provide a visual presentation of these main linkages as they flow out of the agricultural component to the health outcome. The principal components of agricultural strategies and policies that are depicted in the diagram provide a basis for uncovering and identifying the health-related elements. It is useful to enumerate these in a list of questions under each element so as to focus on the relevant agricultural policies, and policy instruments which lead to socio-economic outcomes, which in turn produce the main linkages between health and agriculture in terms of poverty alleviation, food and nutrition and the health implications of technical change. (See Exhibit 1A).

THE HEALTH IMPACT OF AGRICULTURAL POLICIES IN SRI LANKA

This section attempts a selective application of the analytical framework set out in Exhibit 1 to some of the major agricultural and food policies that were pursued in Sri Lanka. It does not attempt to

provide an overview of the entire range of agricultural programmes and policies covering the different crops and subsectors. It focuses on those components of agricultural policy where the impact on poverty alleviation, food availability and technological change are likely to have been the greatest. In doing so the analysis attempts to illustrate how the health-related policy components could be identified and developed to a "health policy" within the agricultural sector.

The boundaries of agricultural policy cannot be defined very precisely or rigidly. Agriculture narrowly defined will deal only with the policies and programmes which are concerned with agricultural production. In most national systems the subject of food which includes food supply and food distribution and relates to the needs of demand of the consumers would be either a separate or part of a separate portfolio. In Sri Lanka Agriculture and Food have often been combined in one Ministry, and on other occasions have been subjects of different Ministries. Food availability and prices of food are not only determined by domestic food production and producer prices administered by the Ministry of Agriculture, but also depend crucially on other policies such as food subsidies, systems of procurement and distribution. These in turn are governed by macro-economic policies adopted in the management of the economy — such as budgetary, monetary and exchange rate policies. A full analysis of all these implications for food prices and food availability is beyond the scope of this paper. Even though the agricultural strategy has many elements, which focus directly on the poorest strata in rural Sri Lanka, it is inevitable that services and programmes directed at increasing production are utilised best by the potentially efficient farmers, with human and other resources for rapid absorption of the new techniques. Agricultural services tend therefore to concentrate on the farmers with demonstrated potential for high productivity and leave behind the poorer or less efficient producers.

These groups who lag behind, or are altogether neglected by the system, can be identified in various parts of the agricultural sector. The identification of these groups is one of the first prerequisites for identifying the key linkages between agriculture, poverty alleviation and improvement of health and nutrition. Exhibit 1 is an initial attempt to map the main pathways along which the socio-economic outcomes of agricultural policy eventually link with health and nutrition. Each item enumerated needs to be analysed in much greater detail, in a given national context, to identify the various

health-related elements in the policies themselves, and their specific or nutritional outcomes.

The whole agricultural policy, the issues and questions they raise and their implications for health cover too wide an area for a study of this nature to be meaningfully undertaken. The area of study has therefore been narrowed down to small-holder and peasant agriculture and to agriculture devoted primarily to the production of food items other than tea. Within these limits it examines rice production — the major programme in small-holding agriculture — other food crops, coconut, sugar, and the small-holdings under tree crops. Within this area the principal linkages between agricultural outcomes and health outcomes are examined in terms of:

- (i) the contribution of agriculture to income generation and poverty alleviation;
- (ii) the contribution of current agricultural programmes to food availability and the satisfaction of the nutritional needs of the population;
- (iii) the intensification of existing health hazards and the new health hazards generated by technological changes in agriculture;
- (iv) health implications of important demographic changes resulting from agricultural development; and
- (v) other special health problems which are related to agriculture.

THE CONTRIBUTION OF AGRICULTURE TO INCOME GENERATION AND POVERTY ALLEVIATION

The agricultural strategy in Sri Lanka during the last four decades centered on the paddy rice economy. The increase in domestic paddy cultivation became a fundamental policy objective of the government since independence in 1948. The concentration of effort on the rice sector fulfilled several socio-economic objectives. First, in order to achieve increased production government programmes had to improve the productivity of what was in the 40s, the most backward and least productive of the agricultural sectors — the peasant small-holding sector. Second, rice production was seen in the larger context of import substitution and savings of foreign exchange to assist in the management of the country's balance of payments. Third, the effi-

cient administration of the food rationing scheme had to rely on the ready availability and distribution of rice. The special elements of the paddy programme which had an impact on the alleviation of poverty was the land settlement programme through which the poor landless peasants in the densely populated wet zone were resettled in agricultural schemes in the dry zone under which they obtained an economic allotment of land. These schemes were generously provided with resources to develop the infrastructure for the settled communities, including housing and other civic amenities such as medical centres, schools and townships.

This peasant sector in agriculture, however, continued to have marginal groups. These included:

- farming communities depending on minor irrigation schemes with uncertain supplies of water or with land subject to periodic flooding and inundation;
- farmers with very small holdings and fragmented land allotments, insufficient to provide subsistence income;
- categories of landless labour suffering from seasonal unemployment and underemployment;
- the second and third generation of the newly settled population who had limited or no access to irrigated land and often engaged in marginal cultivation on illegal encroachments;
- women whose participation in agriculture was adversely affected as a result of the new technologies.

In each of these areas it is possible to identify government initiatives directed at the amelioration of existing conditions. For example, agricultural investments include the improvement and rehabilitation of minor irrigation schemes and flood protection projects which affect the first category that has been enumerated. The government is greatly concerned with the problems of the 2nd and 3rd generation settlers. This, however, remains less tractable as it has to be eventually solved through greater diversification of the rural economy and expansion of non-agricultural employment which can absorb new entrants to the workforce in these settler communities. The landless labour have received priorities in the selection for settlement schemes but this has had a limited impact on the problem. The problems of

women in agriculture are beginning to receive special attention through a Ministry which has been created to deal with the role and status of women. Each of these initiatives offers scope for the integration of health and agriculture.

Outside the paddy sector there is a considerable section of the farming population engaged in seasonal agriculture which fall into the vulnerable category. These include farmers whose main livelihood has been an unstable form of highland agriculture. These are mainly in the districts which fall into the dry zone and are in locations where there is no potential for irrigation. These communities have been included in some of the integrated development programmes that are being implemented by government. Here again, there would be ample opportunity for intersectoral programmes in which agriculture and health could collaborate.

In tree crop agriculture vulnerable groups are to be found in several well-defined areas. The group which has been recently the focus of attention is the resident workforce of Indian descent in the plantation sector. Agriculture-specific policies in this sector related essentially to wage policy and the other employment benefits for this workforce. This is one of the sectors in which there has been significant collaboration between the agricultural managers and health personnel for improvement of the health and nutritional status in general and child and maternity care and nutrition in particular. The agricultural component for the improvement of health and nutrition in this area would have to include measures at agricultural diversification, promotion of home gardening and livestock.

Another readily identifiable segment is the rural population in the villages which bordered the plantations which generally have inadequate land resources and are heavily dependent on seasonal employment in the plantations. Agricultural strategies would need to pay special attention to these rural communities which comprise the segment which is worst affected by poverty.

The third identifiable component is the group of small-holders depending on export crops. In many cases the plantation in these small-holdings is superannuated and low yielding. They require replanting but most households in this group are unable to forego their present income to replant and increase productivity in the long run.

FOOD AVAILABILITY AND NUTRITION

The contribution of agriculture to food availability and nutrition could first be examined in terms of the average food basket and the per capita food availability for the country as a whole. Data on per capita food availability are presented in Exhibit 2.

The age adjusted norm for the daily nutritional intake per head has been estimated at 2,047 calories per day by the Department of Census and Statistics in collaboration with the Medical Research Institute. This is derived from a daily equivalent of 2,500 calories. The food availability for the period 1983 to 1987 has been above the age adjusted norm. The data on food availability is available from food balance sheets from as far back as 1950. The trends indicate that the average consumption per head per day has been steadily increasing from an average 1,950 in the 1950's to 2,160 in the 1960's, to 2,230 in the 1970's and finally 2,300 in the 1980's. These are averages for the three decades 1950 to 1980 and the 7-year period 1980 to 1987. In terms of the overall demand for food it can therefore be said that policies of agricultural production combined with policies relating to food supply and availability succeeded in increasing the average consumption of food above the minima.

As against this, however, it is necessary to examine the distribution of the food intake which is a function of incomes and food expenditure. The recent analysis of the data on the socio-economic survey of 1985–86 indicates that approximately 49% of households are energy deficient in the sense that their nutritional intake is below the recommended intake. Within this the households which are considered nutritionally at risk in that they consume less than 85% of the recommended intake comprise approximately 22% of the total number of households; within this group, the households identified as ultra-poor, with calorie intake below 80% of the normal and a proportion of food expenditure more than 80% of the total budget, is approximately 2.9%.

The data from the most recent nutritional surveys also indicate the prevalence of a high degree of malnutrition. See table:

Undernutrition — Sri Lanka 1975–76, 1981–82, 1987

Survey Year	Age Group (Months)	Percentages		
		Acute <75%	Chronic Ht. / Age <90%	Concurrent Wt. / Ht. <80%
1975–76	06 — 71	3.4	34.7	6.1
1981–82	06 — 60	—	36.6	12.1
1987	03 — 36	38.1*	27.5*	12.9*

* — 2.00 or more standard deviation from NCHS/CDC/WHO reference.

Source: Nutrition Statistics, Vol. I. 1986; *Sri Lanka Demographic & Health Survey*, 1987.

The performance of the agricultural sector can now be set within this framework of food availability and nutrition. Data on production of the principal items of food including livestock are shown in Exhibit 3. Data on imports of food items are given in Exhibit 4.

It is evident from these data that Sri Lanka has been able to move a great distance in the direction of self-sufficiency on a large number of food items including the staple diet. In 1987 it imported less than 6% of the available supply of rice. It is, however, heavily dependent on imports for its consumption of bread and wheat flour products, sugar, pulses and to a lesser extent milk.

The nutritional policy and plan has identified a number of areas in which agricultural policy may be oriented to nutritional objectives. These include the production of coarse grains, roots, tubers and yams which comprise a considerable proportion of the diet of the poorest households; the fortification of staple foods with additional nutrients such as a mixture of wheat flour with soya flour; the production of nutrition rich food items which would be available to households on reasonable prices, soya, winged bean etc.; promotion of nutrition oriented home gardening; the promotion of inland fisheries to provide a cheap source of protein for the population which do not normally receive the output of the coastal and other marine fisheries.

One of the goals which receive high priority from all governments is the maintenance of prices of essential food items at reasonable levels. The food policy in Sri Lanka had several elements which were directed towards achieving this goal. First the government provided a food ration at subsidized prices, almost to all households. The scheme underwent numerous changes over the last four decades. A reduced ration was provided free, in the late sixties, and finally the rationing scheme was replaced in 1979 by a food stamp scheme which covered half the population. The food rationing scheme was administered through a system of food distribution which became the outlet for various other essential food items such as flour, sugar, pulses, dried fish etc. Over a long period of time the government succeeded in containing the prices of food within very moderate increases. This, it was able to do primarily through a state trading system which was responsible for the procurement of local produce as well as the import of essential food items. However, the food rationing scheme under the state trading system imposed a heavy fiscal burden on the government budget.

The food stamp scheme which limited its coverage to low income households provided the opportunity for better targeting to take account of the nutritional objectives. A restructuring of the scheme, with these objectives in mind, was attempted in the mid-80s but it had to be abandoned due to political pressure which resisted any reduction in the coverage of the scheme. The most recent attempt at dealing with the problems of malnutrition and poverty is the Janasaviya programme. This is primarily a programme for the alleviation of poverty and would eventually replace the food stamp scheme. The scope of this programme extends well beyond agricultural and food policies, although it contains important elements of both. It is therefore not being discussed in depth in the present analysis of the health implications of agricultural policy.

It is seen that many important components of agricultural policy—the rice programme, the land settlement programme, the food subsidy and food policies in general—contributed substantially to the alleviation of poverty and the amelioration of living conditions of the rural poor. Consequently, they combined with other social welfare programmes to improve their health and nutritional status. The health and nutritional outcomes of agricultural policy however were seldom consciously articulated and defined as objectives of agricultural policy. They were the by-products of the policy. Nevertheless, it

is clear from the foregoing analysis, that the health related impacts could have been identified and incorporated as part of agricultural policies in terms of their concerns with poverty alleviation, food and nutrition. Once this is done, the relevant population groups who were affected by agricultural policies could be clearly identified. The agencies responsible for health and health services could then collaborate actively in these agricultural programmes, in an integrated inter-sectoral effort to improve the well-being and quality of life of the poor.

There are two noteworthy examples of agriculture linked policies which have a direct impact on food prices and nutrition. Some of these policy initiatives will originate outside the agricultural sector and will be managed by policy-makers who are responsible for macro-economic policies. The examples concern two important components in the food basket — *coconut and sugar*.

Coconut provides approximately 16% of the average calorie intake of a person, 7% of the average daily consumption of protein and 60% of the fats. It is a common item of food consumption in all income groups, particularly in the densely populated wet and intermediate zones of the country in which the coconut plantation is located. The domestic prices of coconut are set by the prices in the international market and the export duties that are levied by the government which eventually control the allocation between exports and domestic consumption. International prices for coconut have fluctuated very sharply depending on the supply of coconut in the world market as well as other substitutes. The domestic output of coconut has also varied widely depending on the weather. In the past, export duties have been instrumental in regulating both the domestic supplies and prices and in maintaining a relatively stable price level and availability. This situation has undergone very significant changes after the liberalization policies adopted by the government in 1978. There has been a renewed effort to stimulate local production by providing adequate incentives to coconut producers and allowing market prices to reflect more freely the movement of international prices. With devaluation, these prices have been favourable to the local producer. This has led to the diversion of supplies from the domestic market to the external market and consequently increased domestic prices. The government has used the export duties more purposively to achieve the objective of production and export.

In the long run it is likely that this would lead to several consumer responses. There would be a tendency to find cheaper substitutes for

coconut such as soya milk if this is available in sufficient quantities at competitive prices. There is a major production effort to increase the output of soya. The substitution of soya for coconut would have beneficial effects both in terms of increasing export earnings from coconut as well as substituting a product which would be more health promoting. Apart from many positive nutritional characteristics of coconut, it contains a high cholesterol content which is likely to add to the increase in cardiovascular diseases which have become a leading cause of mortality in the changing disease pattern of the country. A programme for coconut production requires, therefore, a careful analysis of potential production and health effects and call for the collaborative effort of professionals from many fields which include macro-economic policy-makers, health professionals and nutritionists.

In the import substitution programmes undertaken by the government, *sugar* has been given high priority. At present the annual consumption of sugar in Sri Lanka is approximately 350 thousand tonnes of which more than 90% is imported. The 10% which is produced locally is manufactured in four factories in the East and South of the country. The government's objective in its current plans is to increase domestic output to satisfy approximately 60% of the total domestic consumption. The analysis of the import substitution projects has indicated that the production of sugar would yield a negative rate of return and would impose a heavy cost on the economy. In the effort to maintain its import substitution programme as well as to contain the prices to the consumer at reasonable levels, approximately Rs.300 million is allocated annually to subsidize domestic sugar production. In order to attract private capital to the new projects the government has guaranteed a rate of return of 14.5% to the private investors. In the new project that has been implemented, 51% of the equity is owned by private investors of which 15% is domestic and 36% foreign. In order to ensure the agreed rate of return, the government guaranteed a higher ex-factory sugar price than either the import price of sugar or the price which is paid to the older sugar factories at the rate of subsidy that has been approved. Taxes on sugar, which is a basic item in the food basket, will have adverse effects on poor households. One calculation has shown that the poorest 25% of the population pay back as taxes on sugar as much as 80% of the income supplement they receive through food stamps. The programme of import substitution in sugar is therefore likely to have serious adverse effects on the food budget of the poor, if there

are no compensating interventions to protect them against these effects.

HEALTH IMPACTS OF TECHNOLOGICAL CHANGES IN AGRICULTURE

The health impact of technological change in agriculture has been considered mainly in relation to the health risks generated by the major irrigation schemes and new settlements; health effects of the use of pesticides, insecticides and agro-chemicals; and the occupational hazards of agricultural workers using agricultural equipment for various operations such as ploughing and threshing. The nature of health risks under the first category, i.e. irrigation and new settlements are examined in greater depth in the case study on Mahaweli. The Sri Lankan experience illustrates what has been commonly observed in other countries. With new settlements in areas sparsely populated, and the conversion of forest to agricultural and other uses, there has been a recrudescence of malaria and water-borne diseases. The irrigation system feeding a large population has numerous problems of transmission due to such factors as poor sanitation and fecal pollution. The health impact of agricultural programmes in this field is receiving greater attention than in the past. Past policies were confined to providing medical facilities in new settlements. The new health hazards that are introduced by these schemes were not closely analysed and studied. In the recent past there has been greater concern for identifying the possible negative impact on health and for taking anticipatory action.

There has been no systematic effort to deal with the problems of pesticide use as well as the occupational hazards of mechanization. If at all, they have been dealt with in an *ad hoc* manner and treated as a residual problem for the health services. Legislation has been enacted to regulate the production and trade of pesticides and related products but there is little evidence of a systematic and coordinated programme of enforcement, education, information and monitoring which reaches rural communities and their households. The available information indicates that over 80% of the cases of poisoning were the result of accidental exposure to agro-chemicals, and that most of the cases of suicide were due to the consumption of pesticides, weedicides and insecticides that are freely available in households for use in agriculture. The Ministry of Health has reported that "the easy availability and indiscriminate use of weedicides and pesticides

has resulted in poisoning become one of the leading causes of mortality in the country" (Annual Health Bulletin, 1987 of the Ministry of Health). Agricultural expansion work includes a programme for the dissemination of information relating to the use of agro-chemicals and pesticides. These, however, are more concerned with the agricultural aspect such as the correct dosage, times of application and do not focus sufficiently on the health hazards.

The entire field relating to the health hazards of the agricultural occupation is one which is relatively neglected. It includes not only pesticides but other technological changes such as the introduction of tractors, threshing equipment, transport equipment. The occupational health of agricultural workers in Sri Lanka is a field in which there could be closer collaboration between the two sectors.

There has been greater coordination of effort between the health and agricultural sectors on the problems relating to the control of vector-borne diseases. The Ministries of Health and Agriculture have initiated collaborative efforts regarding the use of pesticides to avoid as far as possible agricultural application which could result in the vectors developing resistance to the insecticides that are against them. Programmes for mobilising community participation for the control of malaria, which include methods such as the use of fish which feed on mosquito larvae, and the identification and cleaning of breeding sites, are being undertaken.

The newly settled population in agricultural schemes is a group which is specially vulnerable in terms of health. Most of these aspects are examined in the case study on the Mahaweli project. The displacement of migrants from their developed habitats where they had developed their food habits and had access to food of a certain type, and the process of adaptability to a new and different agro-climatic environment, including a somewhat different pattern of food availability would have adverse effects on their nutrition. In addition to the stresses of the new environment, it has to be noted that generally the settlers would be selected from the more deprived social strata. In the initial phase of settlement the agricultural workers often migrate without their families. Housing conditions are poor, and the social infrastructure is in the process of being developed. Not only will the migrant population not be exposed to the new health hazards of the schemes such as malaria, and the intensification of water-borne diseases; they may also introduce diseases which had been endemic in their original habitat to the new communities in

which they are settled. The migrant population in the first phase of settlement is a specially important target group for collaboration between health and agriculture.

SOME GENERAL ISSUES IN AGRICULTURAL POLICY

Agricultural policies in Sri Lanka raise several general issues which impinge on macro-economic policies and the national development strategy as a whole. Critics of past agricultural policies have raised a number of controversial questions regarding the priority given to the import substitution of rice and the neglect of plantation agriculture. These issues require treatment in depth and cannot be discussed within the limited purview of this case study. It is necessary however to point out that a better balance might have been possible with more positive effects on economic growth, poverty alleviation and the physical well-being of the population.

The phase of import substitution in rice is fast reaching its limits, within the present pattern of cereal consumption. There is further potential for import substitution of rice for wheat flour. This will require intensive efforts, with appropriate management of pricing policies and other incentives which will have short-term and long-term implications for food prices, food consumption and nutrition. These require collaborative analysis and planning between agricultural and health planners and policy makers.

Self-sufficiency in rice will also call for new efforts at diversification and export promotion. The recent initiative to increase agricultural productivity at the village level—the programme of Agricultural Productivity Villages—will introduce new cropping patterns which can alter the old balance between food and non-food crops, as well as the balance between production of essential food items for the domestic market and production which is more export-oriented and specialized. These changes will in turn have implications for food nutrition and health. For example, in such a pattern of production lower priority might be given to household production, the mixed farming unit, the home garden with nutritional objectives, all of which can have adverse consequences for health. On the other hand, these may be offset by rapid increases in household incomes, provided other policies and interventions combine to translate these income increases to a higher quality of life and better management of household resources with adequate attention to food nutrition and health.

Two items of the food basket were earlier selected for policy analysis: coconut and sugar. Similarly, it is possible to examine other major items such as milk and livestock which are included for import substitution in the agricultural plans. The policy analysis in respect of coconut and sugar reveals the complexity of the linkages that exists between macro-economic policies, production objectives of the agricultural sector and the food, nutrition and health needs of the people.

CONCLUSION

This paper has presented the general framework of analysis which would facilitate the identification of the linkages. In doing so it has focussed on the more critical linkages relating to poverty, food and nutrition and technology. The second step in the analysis of agricultural policy for health impacts would be to take each component and seek to focus on the specific linkages in each of them which are amenable to policy intervention. The proposed methodology has the following elements:

1. The structure of agriculture, the priorities of current agricultural policies, the projects and programmes flowing from these policies, which have an impact on health.
2. The main health-related policy linkages in agriculture, focussing on poverty alleviation, food and nutrition and technological change.
3. The main population groups engaged in agriculture which can be identified as vulnerable groups and the impact of current agricultural programmes and policies on these groups.
4. The average food basket, the major items in the food basket and programmes and policies pertaining to them which have an impact on food prices, nutrition, health. Here the long-term impact of import substitution programmes and the opportunities available for health-promoting substitution and dietary change can be identified.
5. Major agricultural development projects such as multi-purpose river diversion projects, new settlement programmes which have far-reaching consequences for the environment and health.

6. Technical change and its impact on the agricultural workforce, farm households, consumers of agricultural produce and the health environment as a whole.

This case study has not discussed in depth the agencies that would be responsible for the formulation of policy and policy intervention. In each of the areas discussed the agriculture–health link would require the collaboration not only of the professionals of the agricultural and health sector, but also the policy-makers in other sectors including those responsible for macro-economic management. This was illustrated in the brief analysis of policies relating to coconut and sugar. The next stage of this exercise will be to take it further to identify the package of policy interventions in specific areas and the mechanisms for coordinating the formulation and implementation of policy.

EXHIBIT 1

The Health Impact of Agricultural Policies

POLICIES	POLICY INSTRUMENTS	SOCIO-ECONOMIC OUTCOMES	HEALTH IMPACTS
1. Policy Goals			
Maximizing output & Productivity	Taxes.	Income Generation	Alleviation of Poverty.
Export Promotion.	Tariffs.	Foreign Exchange Earnings.	Increase in income of vulnerable groups.
Import Substitution.	Protection.	Foreign Exchange Savings.	Diverting high value food products from domestic consumption to exports.
Diversification.	Export incentives.	Change in overall and relative prices.	Switching from food to non food cash crops.
Food Self Reliance.	Subsidies. ,	Food availability.	Trade-offs between domestic food consumption and increasing purchasing power
	Guaranteed Price Schemes.		
	Market Oriented vs State Regulated systems		
2. Allocation of Resources within Agriculture			
Food - staple Rice	Special package programmes.	Income generation.	Adequate food supply within purchasing power of low-income groups.
Wheat.	Instruments as at 1.	Food availability	
Coarse grains.	Investments in irrigation.	Nutrition.	
Pulses.	Investments in agricultural settlements.	Industrialization.	Increasing output of staple food for poor.
Coconut.		Non-farm employment	
Livestock.	Replanting programmes.	Foreign Exchange Earnings.	Enhancing quality of average food basket.
Fish.	Consumer subsidies (food subsidies).	Price stabilization and income support.	
Beverages			Enhancing living condition of poorest segments -
Tea			

Cocoa. Coffee.	landless labour marginal smallholders shifting or unstable agricultural systems etc.
Industrial Raw materials Cotton. Rubber. Jute.	
3. Policies relating to Structures of ownership.	
Large scale holdings with wage labour and tenants. Small-scale holding with owner cultivators and tenants Co-operative. Collective.	Consolidation of holdings. Proletarianisation and immiserisation of poor farmers. Improved access to land for the poor Trade off between equity and efficiency.
	Alleviation of poverty and landless.
4. Technological Change.	
High yielding varieties Irrigation Agro-chemicals-pesticides weedicides, fertilizers. Mechanization	Increase in inequality mixed with improvement of productivity of the backward segments. Increase in water-borne diseases & vectors of parasitic diseases. Health hazards to users. farmer families & consumers of agricultural products. Occupational hazards to users of equipment vs reduction of human energy inputs

EXHIBIT 1A

The Disaggregation of Health-related Components: List of Questions

(i) Goals

- How are the stated goals of agriculture related to poverty alleviation, food availability and nutrition? How are these concerns reflected in the main sectoral strategies and objectives?

(ii) Poverty Alleviation

- To what extent is the allocation of resources directed towards the poorest and backward segment of the agricultural sector? Do the priorities assigned to increasing agricultural output neglect the possible repercussions of policies on the vulnerable groups in agriculture, for landless labour, owner cultivators with inadequate land resources, systems of cultivation with inadequate water, women and their role in agriculture?

(Many countries in their effort to increase production have concentrated on areas where the returns are highest at the expense of areas where the need was greatest. This is well documented in the experience based on the introduction of high-yielding varieties in rice and wheat.)

- What is the priority given to the production of staple food as against non-food items, too expensive high-quality nutrient-rich products as against high-calorie foods from which the poor get their proteins, as, for example, cereals and pulses; cheap staples such as roots, yams and tubers which form a high proportion of the basket of the poorest?
- Is priority given to high-yielding varieties as against robust products suitable for local conditions with lower production costs?
- Is cash cropping, with its capacity to generate employ-

ment and raise incomes at the expense of traditional farming, having an adverse impact on nutrition of the most vulnerable groups?

- Are there policies to improve access to poor small-holder farmers, tenant farmers and the landless to land?
- Are there policies to improve their access to agricultural resources: water, credit, seed?

(iii) *Food and Nutrition*

- Do pricing policies take account of food and nutrition issues — especially in relation to food prices?
- What is the impact of guaranteed prices on conditions and incentives relating to food production on the one hand, and to food consumption and food security on the other?
- What impact do food subsidies have on conditions and incentives relating to food production on the one hand and food consumption and food security on the other?
- How realistic are guaranteed prices as against market prices?
- Is there legislation relating to agricultural land which impede agricultural growth?
- What are the programmes to minimise post-harvest losses.
- Are home gardens promoted to provide complementary nutrients?
- Is there awareness of health risks of dangerous crops/products such as tobacco? Are efforts made to deal with them? Are farmers of harmful crops provided with other equally income-yielding crops or alternative employment to enable regulatory interventions to be effective? To what extent is concerted action through public policies, propaganda, information and education, meaningfully endeavouring to protect health by reduc-

ing the demand for them?

(iv) *Technical change and research*

- What are the health hazards of major development projects such as irrigation, land settlement, e.g. environmental damage, spread of water-borne diseases, malaria, vulnerability of newly settled population in terms of social dislocations, nutrition, and new health hazards?
- What are the effects of technical changes on labour, employment and the use of human energy, particularly of women?
- What Policy initiatives and safeguards exist as regards health risks from agro-chemicals, pesticides etc.?
- What are the policy initiatives and safeguards regarding accidents and injuries resulting from the mechanization of agricultural operations — ploughing, threshing etc.
- Does Scientific Research focus on improving conditions of poor farmers through variety improvements, crop mixes and overcoming problems of seasonal fluctuations, droughts, floods etc.

EXHIBIT 2

Per Capita Calorie Intake in Sri Lanka 1960-87
(Selected Items and Totals) (Calories per day)

Year	Rice	Grains Wheat Flour	Other roots Grains	Tubers & Other starchy food	Meat	Eggs	Fish	Milk	Oil & Fat	Total
1960	1084.25	204.14	31.68	92.66	10.44	4.46	71.24	34.05	87.94	2182.62
1961	1073.45	208.32	30.13	102.85	7.82	4.92	56.90	24.90	88.37	2116.33
1962	981.51	163.65	27.71	93.90	8.52	4.49	46.01	39.23	87.94	2012.58
1963	137.78	195.18	33.07	81.76	8.36	7.26	53.82	37.50	87.94	2118.33
1964	955.83	212.61	27.66	94.18	8.60	7.57	56.84	42.82	88.47	2086.39
1965	1060.77	216.00	26.64	78.57	8.53	7.10	48.41	44.73	87.01	2154.43
1966	1039.41	279.04	24.96	95.99	8.62	7.37	75.86	42.11	87.37	2229.08
1967	908.47	393.81	35.27	84.16	6.83	7.21	48.97	36.92	87.01	2184.49
1968	956.81	328.18	26.56	88.07	7.14	8.12	55.06	37.12	87.15	2169.34
1969	965.67	317.04	25.16	82.52	8.32	7.73	54.49	32.92	87.80	2179.15
1970	1080.34	294.29	20.27	73.44	7.02	7.57	36.67	40.08	100.88	2370.64
1971	938.52	223.48	17.25	105.47	5.75	9.91	32.71	45.25	99.72	2230.53
1972	876.09	316.09	16.17	88.02	5.58	11.80	35.58	42.25	100.36	2158.14
1973	853.61	326.84	24.61	159.58	5.57	9.29	34.88	45.60	74.44	2169.42

Year	Rice	Grains Wheat Flour	Other roots Grains	Tubers & Other starchy food	Meat	Eggs	Fish	Milk	Oil & Fat	Total
1974	943.98	310.80	28.15	189.69	3.80	6.97	26.71	34.79	63.01	2135.78
1975	788.18	367.73	32.87	261.87	5.07	7.23	33.98	34.77	78.79	2127.10
1976	896.51	385.55	31.81	198.56	4.29	7.01	32.69	35.47	57.86	2172.07
1977	1042.22	409.98	37.06	144.92	4.29	7.20	24.46	42.33	74.32	2343.10
1978	929.21	429.43	25.01	149.81	4.21	6.68	40.13	49.73	70.90	2325.41
1979	878.43	361.54	21.17	140.54	4.09	7.87	36.59	53.40	109.42	2316.60
1980	966.00	204.14	21.87	130.12	4.28	9.76	38.91	53.12	84.73	2169.40
1981	983.41	239.70	19.36	138.49	4.12	9.84	38.79	47.99	79.47	2200.12
1982	944.29	264.86	20.75	146.21	4.07	9.05	41.92	47.89	81.22	2188.69
1983	1002.75	253.51	23.46	169.88	4.02	9.72	45.91	60.49	73.33	2361.43
1984	1031.50	283.17	27.01	161.48	6.42	9.48	45.62	53.55	28.80	2385.05
1985	1080.47	303.77	16.51	137.81	5.16	10.46	43.18	61.52	96.54	2157.48
1986	988.78	270.84	34.46	112.46	7.73	10.90	43.57	45.40	89.34	2376.83
1987	902.90	279.27	13.69	99.14	7.93	13.13	47.88	61.71	91.17	2267.40

Note: Total Calorie intake is worked out on the basis of all food items:

Sources: Food & Nutrition Bulletin 1986 Sri Lanka,
 Nutritional Surveillance Vol.II, p.19 (1960-84)
 Food Balance Sheets, Dept. of Census & Stat. (1985-87)

EXHIBIT 3

Selected Items of Principal Foods Produced Locally

	<i>1977</i>	<i>1987</i>	<i>Percentage increase</i>
Paddy			
Area cultivated — '000 ha.	828	896	8
Production — metric tons	1.65 mm	2.1 mm	31
Yield per hectare — kg.	2,521	3,500	38
Fertilizer used — metric tons	82,569	197,380	140
Other Food Crops			
	<i>1977</i>	<i>1986</i>	
Total area '000 ha.	252	218	-13
Total production '000 mt.	801	852	6
Selected crops			
Manioc			
Area — '000 ha.	55	27	-5
Production '000 mt.	545	503	-8
Yield per hectare — kg.	10,027	18,207	82
Red Onion			
Area — ha.	8,163	8,637	6
Production '000 mt.	66	76	15
Yield per hectare — kg.	8,161	8,856	8
Potato			
Area — ha.	3,200	7,880	142
Production — mt.	33,422	108,100	230
Yield per ha — kg.	8,161	8,856	16

Agricultural Policies and their Impact on Health

	1983	1987	Percentage increase
Sugar			
Produced — '000 mt.	21.83	34.54	58
Imported — '000 mt.	268.33	339.4	27
Available supply '000 mt.	258.35	339.66	31
Livestock			
No. of beef cattle slaughtered	1,95,000	1,97,000	1
No. of sheep and goats slaughtered	1,29,000	1,44,000	12
No. of pigs slaughtered	19,000	17,000	-11
Litres of milk — million	216	195	-19
No. of eggs produced — millions	380	815	114

Source: Central Bank.

EXHIBIT 4

The Imports of Food Items in 1987

(Population 16,361,000)

<i>Commodity</i>	<i>Gross imports (’000 m.t)</i>	<i>Percentage of available supply</i>
A. Cereals		
Rice	150.55	6
Maize	13.70	23
Wheat flour	438.18	100
B. Roots/Tubers and Starchy food		
Potatoes	0.002	—
C. Sugar		
Refined	339.49	90
D. Pulses and Nuts		
Soya bean	0.20	—
Cowpea and Dhall	45.24	67
T.V.P	0.32	—
E. Vegetables		
Onion	34.40	35
F. Meat		
Tinned	0.06	—
Beef	0.05	—
Pork	0.002	—
Mutton (Goat & Sheep)	0.06	—
Poultry	0.10	—
G. Fish		
Fresh	0.002	—
Dried and salted fish	35.37	87
Tinned fish	7.74	100

Agricultural Policies and their Impact on Health

<i>Commodity</i>	<i>Gross imports (’000 m.t)</i>	<i>Percentage of available supply</i>
<hr/>		
H. Milk		
Cow	0.002	—
Tinned (Whole Dried)	35.78	88
Condensed Milk	0.02	—
I. Oil Fats		
Margarine	0.73	—
Butter	1.88	85
Cheese	0.33	—

Source: Food Balance Sheet — 1987.

THE MAHAWELI PROJECT

INTRODUCTION

Mahaweli is the largest single agricultural development project in Sri Lanka. The original Master Plan for the project envisaged:

- a) the provision of irrigation facilities to 340,000 hectares of paddy fields. Approximately; two-thirds of this comprise new land in the North Central, Eastern and Northern Provinces in the country. The balance one-third which is in the same area, and is already cultivated, would receive an augmented and more regular supply of water which would increase its cropping intensity;
- b) development of hydro-electric power to an installed capacity of 500 megawatts;
- c) the integrated development of the region, with crop diversification and agro-industrial development.

The implementation of the project was planned over a period of 30 years. The first phase which covered the area, designated as system H, was undertaken in the early seventies.

Towards the end of the Seventies the implementation of the project was accelerated and the main components of the project benefiting an extent of 130,000 ha. of new and 36,000 ha. of already cultivated land were included in a programme to be completed within a period of six years.

The Accelerated Mahaweli Project concentrates on five of the largest

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viable projects viz. Victoria, Maduru Oya, Kotmale, Moragahakanda and Randenigala. Being a diversified resettlement programme the Mahaweli project will have aspects which extend beyond the agricultural sector for it will have to deal with problems that flow from such phenomena as internal migration, diversification of the rural economy with small industries and other non-farm activities, the development of the infrastructure relating to new settlements such as water, environmental management and new urban centres. Even the settlement pattern has been restructured. The layout of settlements in the older Gal Oya and Walawe irrigation schemes was on highland allotments, arranged in dispersed ribbon pattern. The Mahaweli has adopted the profile of the 'cluster' system which is a grouping together of households in well-planned hamlets. The concept of the traditional *purana* villages influenced the creation of the hamlet type of settlements for the area.

A special statutory authority was established to implement the project. The organisational structure and powers of the Mahaweli authority were similar to the statutory boards which were set up to implement other major multi-purpose projects in the past, but the structures were modified and improved on the basis of the lessons learnt from the experience of these earlier projects. The Mahaweli Authority was responsible for the integrated development of the region which came under the command of the irrigation system of the project and combined a large number of the functions normally performed by the line Ministries with their departmental structures. It was therefore better organised and empowered to undertake the horizontal coordination of a large range of development activities within the region. As would be seen later this was particularly effective in the case of the intersectoral coordination required for primary health care. Under the Mahaweli authority separate agencies were entrusted with specific components of the development programme. The Mahaweli Economic Agency was responsible for agricultural, economic and social development and land settlement.

The Mahaweli was the largest single investment undertaken by the Government. The relative magnitude of the outlay can be appreciated when it is compared with the total annual capital expenditure of the recent past or the total gross capital formation of the country as a whole. The total investment made upto the end of 1986 amounts to Rs. 44 billion (in 1986 constant prices) which is the equivalent of 125% of the entire government capital expenditure for 1986 including

Rs.7.5 billion of amortization payments on the public debt, or 104% of the gross capital formation for that year. These magnitudes indicate the scale of the concentrated organisational effort and mobilisation of human resources that were needed to implement the project during a period of about 7 to 8 years.

INTERNAL MIGRATION

It has been estimated that approximately 54,000 families with a total population of about 300,000 have been settled in the Mahaweli project upto 1986. This does not include the population that would have migrated into the area for various economic activities and who have not come under the regular programme of settlement. Of the settler families approximately 50,000 families have migrated in the period 1980–1986. These figures provide some perspective of the dimensions of the effort involved in the transfer of population, their settlement and the scale of the services and other facilities needed.

The settlers have come from different parts of the country. They are selected on specified criteria — age, education level, tenurial status, working capacity, family encumbrances, farming experience and personality. The highest scores are given to those in the age groups 25–29 years and 30–39 years after which the score for this criterion declines. High scores are also given to the literate and the landless. The weightage given to the criteria raises a number of issues.

First, the age criterion suggests that the programme is aimed at mitigating the problems of unemployment among the young. This is reflected in the weightage given to the young unlike in the past when selection was on the basis of families with a fairly balanced age structure. Consequently, the settlement of Mahaweli may run into different social and health problems. Age-wise the community may not be well balanced and may not form viable social units. This, however, may be partly offset by the tendency of some of these younger families to migrate with their dependent parents, and other members of the parental family. Some of the social as well as inter-generational problems arise from the very migration process itself which results in displacements and changes in the traditional life styles. This can lead to an increase in mental ill health of all types.

Second, the selection criteria in regard to family size tend to give preference to those in the high fertility groups. A significant proportion of the families are likely to be in the peak of their reproductive

age, and their family size may continue to increase, unless there are effective family planning interventions.

Third, it has also been pointed out that the weightage given to literacy and education combined with younger age can result in greater receptivity to programmes for improvement of health behaviour.

Fourth, the settlers are from different areas having different environmental, social and economic conditions. The food habits, the health behaviour and access to food resources of the migrants in their original habitats are likely to be significantly different from what is available in the Mahaweli settlements. A significant proportion come from the wet zone. The Mahaweli environment, on the other hand, belongs to the dry zone which is characterised by relatively sparser rainfall which is highly seasonal. Humidity is low and temperatures are high. Rainfall unreliability and the late or early arrival and departure of the monsoons disrupt the normal working cycle; the frequent non-arrival of rains leading to prolonged droughts brings with it numerous health hazards. In addition to these problems, migrants are likely to introduce into the new community diseases endemic in their earlier habitats.

Fifth, the policies are such that once selected and granted allotments, the settlers are at liberty to decide how they would establish their residence in the area. It has been revealed from the experience in the H areas that initially males alone come in for settlement, construct temporary huts for themselves and bring their families only after obtaining one or two harvests. This is an understandable and valid procedure. However, this practice can limit to a very high degree, the settlers adopting a sound health discipline such as having proper food at correct times, drinking boiled or safe water, maintaining personal cleanliness etc. It can also lead to loneliness and depression and even lay the path to spread of social diseases.

In view of these problems the Ministry of Health has recommended the following:

- a) measures that enable the settlers to have habitable permanent dwellings in the early stages of settlement.
- b) intensification of the community development strategy and
- c) the modification, where necessary, of the policy relating to selection criteria.

SERVICES AND HEALTH STATUS OF MAHAWELI AREA

The health system in the Mahaweli area is part of the national health system and is organised in the same manner as for the rest of the country. The institutional framework for health services in the Mahaweli settlements themselves, including preventive and curative care, is in the process of being developed. The present health services, in the eight districts, within which the Mahaweli area falls, are managed at the apex by five Superintendents of Health Services (SHS) Divisions and ten Medical Officers of Health (MOH) areas. According to a Ministry of Health–WHO report it is revealed that health resources in the District covering the Mahaweli area is lower than the national average in a number of aspects.

- “a) Number of beds per 1000 population is lower in some of the districts;
- b) Several districts are severely affected by health staff shortage;
- c) The national ‘by-passing’ of lower level facilities is also very much in evidence in most areas”.¹

The priorities for health in the Mahaweli area, as perceived by the Mahaweli Authority include the following:

1. Provision of adequate and safe water supplies to all settlers.
2. Immunisation of infants.
3. Environmental sanitation and environmental protection.
4. Health education.
5. Spraying of dwellings with insecticides.
6. Providing permanent housing on allocation of land.
7. Pre-settlement medical screening of all settlers.
8. Setting up of a health monitoring system at hamlet level.
9. Setting up of a malaria surveillance system.
10. Preliminary assignment of health staff.
11. Organising volunteer health workers.
12. Adoption of a significant reporting system.

According to the Health Ministry–WHO report, the health situation in the Mahaweli area is not very different from the rest of the region.

Mahaweli Project

In general, the vital statistics of Sri Lanka are quite favourable for a developing country and its health care system has been able to maintain infant and maternal mortality at very low levels compared with those of other developing and developed countries. CBR, CDR, Infant, neo-natal and maternal death rates in the districts which cover the Mahaweli settlements are indicated below:

Vital Statistics in the Mahaweli Districts, 1985*

<i>District</i>	<i>CBR</i> <i>1987</i>	<i>CDR</i> <i>1987</i>	<i>Maternal</i> <i>Mortality</i> <i>Rate 1983</i>	<i>Infant</i> <i>Mortality</i> <i>Rate 1983</i>	<i>Neonatal</i> <i>Mortality</i> <i>Rate 1983</i>
Matale	24.0	5.9	0.4	20.8	12.9
Trincomalee	21.7	4.2	0.2	13.7	6.2
Kurunegala	20.9	5.7	0.6	27.1	10.1
Anuradhapura	21.7	5.9	0.6	22.6	13.0
Polonnaruwa	21.3	4.7	1.4	10.2	4.4
SRI LANKA	21.9	5.9	0.6	28.4	17.3

*Provisional. *Source:* Registrar General's Office

It should be noted that the data represent the situation in these Districts as a whole and that the population in the Mahaweli settlements is only a small proportion. Furthermore, the district data may exclude the district residents who report to hospitals which are outside these districts, and whose deaths will be registered through those institutions. But even when allowance is made for these factors, the data presented in the table are broadly indicative of the conditions that prevail in the Mahaweli area. As may be seen later this is confirmed by the data collected in the Village Health Project for the H system of the Mahaweli project which comprises more than 50% of the settled population. Infant mortality is lower than the national average for all these districts. It is significantly lower for Trincomalee and Polonnaruwa. Polonnaruwa, however, reveals higher maternal mortality rates than the average whereas the other districts have rates which are either same as the national rate or lower. The exceptionally low maternal mortality rate of 0.2 per cent in

Trincomalee indicates the better standard of hospital and other facilities available in the District.

The country health programme recognises 36 diseases and conditions as requiring priority attention of the health services. Of course, ten diseases are considered as of primary concern in the Mahaweli development area by the Health Ministry-WHO team. These are:

1. Malaria, 2. Gastroenteritis, 3. Accidents, poisoning and violence, 4. Bacillary dysentery, amoebiasis, 5. Anaemia, 6. Avitaminosis and other nutritional deficiencies, 7. T.B. (all forms), 8. Typhoid, 9. Respiratory diseases and 10. V.D. Healthwise although the Mahaweli area reveals very little difference from other areas of the country some significant characteristics which distinguish this area from the rest of the region are indicated. These are:

- (i) Accidents are higher than average in H area.
- (ii) Gastroenteritis is much higher than the average in C area.
- (iii) Malaria is much higher than the average in 10 of the 12 institutions tested (all areas).
- (iv) Nutrition is found to be very poor in all developed areas.
- (v) In general, diseases of the circulatory system are lower than the average.
- (vi) Polio seems to be higher than the average in most areas.
- (vii) Matale and Kurunegala show higher levels of viral hepatitis.
- (viii) V.D. — Anuradhapura Clinics showed 300 per cent increase in attendance in 1979.

PRIMARY HEALTH CARE

Within the Mahaweli Area itself the government has been able to implement a Village Health Project supported by the UNICEF and CIDA (Canadian Development Authority). It covers system H which has a settler population of 23,000 families and is expected to serve as a model for replication in the rest of the Mahaweli area. The Project is designed mainly to develop a Primary Health Care System with health volunteers and para-medicals. It covers nutrition, immunisation, primary education, child care, water supply and environmental sanitation, development of basic life skills and community participation. As stated earlier, the health system in the Mahaweli project is

part of the national health system and is organised in the same manner as for the rest of the country. While the Mahaweli Development Authority is responsible for the horizontal integration of certain sectoral activities such as irrigation, water management, agriculture, and community development, and most other services provided by line Ministries, health and education are administered by the national line Minister. Nevertheless the horizontal organisation of other work by the Mahaweli Development Authority has provided an overall framework which facilitates the integration of the different elements of the Village Health Project.

A recent evaluation of the project rates it as: "An outstanding success. A remarkable achievement, which is almost unique, is the successful integration of activities for economic development and for social services, especially for the health of women and children. A truly synergistic balance between purely technical improvements in agriculture irrigation water management and similar activities promoting economic progress have been associated with the development of excellent services to improve the quality of life of the settlers." Many of the health outcomes of the project are impressive. Infant mortality is below the national average and in the region of 15. Over 90% of the births are institutionalized. Progress has been made in the control of diarrhoea and malaria. Immunisation coverage is 95% , approaching universality. Growth monitoring is undertaken by 94% of the mothers. Model home gardens have exceeded the targets. Targets in most of the other components — water supply, development of basic skills, fuel saving and training — have been fully achieved. Nevertheless, the surveys have noted a high level of malnutrition: "About a third of the babies are low birth weight. About a third of the children are below the third percentile of growth charts; about half of the mothers are anemic and many severely so."

MALARIA

In Sri Lanka the *Anopheles cuticifacies* is mainly a dry zone species. Consequently, the dry zone is the major malaria endemic region and Mahaweli falls within this zone. Eradication of malaria is a major health problem in the Mahaweli area and because of migration of settlers and water diversion the situation may become very critical. It is also revealed that in the Mahaweli areas positive rates have increased in all divisions and is above the national average in three of the five. In general, the percentage of OPD cases of malaria

recorded is far above the national average of 4.9 per cent. The vulnerability of the areas has been recognised and the anti-malaria campaign has been fully involved from the planning stage of the Mahaweli project.

It is relevant to note that this mosquito prefers to bite animals rather than human beings for its blood meals. In the Mahaweli environment large tracts of jungle are cleared, water courses and bodies are increased, new areas come under water and the wild animals are forced to migrate elsewhere. The natural animal hosts being scarce or absent, its survival depends on the new host, man, who falls victim to its attacks. Consequently, the potential for malaria has increased in the Mahaweli area which is already in the endemic zone. Another factor that enhances the malariogenic potential is the settler. Under the settlement policy people from different parts of Sri Lanka are admitted to these areas as workers and settlers. The majority of them come from less malarial or non-malarial areas.

Hence, a large majority of these new residents have very low immunity levels or no immunity against malaria. In this situation the new residents are easily infected by the malaria parasite and are subjected to more severe attacks of malaria than the local residents who have a high degree of immunity.

The prevention of malaria is considered a vital issue in the development of the Mahaweli Scheme. Definite policies, therefore, have been adopted for its control or eradication. According to the Anti-Malaria Campaign the main objectives for the programme are:

- a) prevention of deaths due to malaria
- b) elimination of malignant malaria progressively,
- c) reduction of the incidence of malaria and minimizing the loss of non-working days.

The achievement of these objectives is through definite work programmes carried out in close cooperation with the settlers who are the chief beneficiaries in this scheme. The work programme according to the campaign will be:

- i) residual spraying of households and out-houses with Malathion on a three month cycle,
- ii) coordination of the agricultural use of insecticides with the malaria-control programme. (The Ministries of Health and

Agriculture have initiated a dialogue to examine how they should collaborate to reduce the risk of the vector building up resistance to the insecticides in use),

- iii) drug administration: five-day remedial treatment to all cases and prophylactic treatment to officers and workers;
- iv) case detection. (There are 36 Special Indicator Institutions for this purpose)
- v) entomological investigations (Twelve entomological teams carry out this type of investigations in the malarious areas of the country).
- vi) other control methods (eg. intermittent flushing of streams, water courses etc., biological control etc.)
- vii) training and health education, and
- viii) research and field trials.

ACCIDENTS, POISONING, VIOLENCE

Detailed information on accidents is not readily available. However, with such an influx of people especially of the younger active age groups, from different environments and with varying exposures to new agricultural technology there is the possibility for many accidents to occur due to unfamiliarity and inexperience in the use of modern equipment. Construction work goes on at a rapid rate and the equipment used is heavy and sophisticated. Under those conditions, the workers, unless properly cautioned and trained, are bound to have accidents which can vary from minor to major. Moreover, the majority of the settlers are not familiar with mechanized agriculture. Consequently, there is always the probability for some serious mishaps to occur owing to inexperience and incompetence.

During the early stages of the scheme the accident rate in the Mahaweli area has varied from about 10.1 per cent to 24.4 per cent with the national average at 10.7 per cent. Whether the accident rate has appreciably decreased is doubtful, as the careless use of agricultural equipment, especially by young settlers is observable. Tractors of various sizes, which are a common sight in the area, are driven on the road without dismantling attachments used in the fields, thereby leading to obstruction of highways and serious accidents involving both man and other vehicles. Overloading of trailers leading to capsizing is another common feature. Careless handling and stacking

of paddy and other cereals have caused unnecessary accidents especially during harvest time. Above all, unprotected belt-driven devices such as blowers, threshers, crushers etc. are causing a number of serious accidents quite frequently. In most cases accidents are caused by ignoring elementary precautions. These can certainly be corrected with carefully planned initial training.

POISONING

In the agricultural sector problems of toxicity arise from the use of agro-chemicals. Although definite information on pesticide use and its associated problems of toxicity is not available, the Ministry of Health data on admissions to hospitals and deaths due to poisoning in the Mahaweli district hospitals reveals the status of this phenomenon in the area.

Death due to pesticides in some Mahaweli Districts

<i>District</i>	<i>1977</i>	<i>1978</i>	<i>1979</i>	<i>1980</i>	<i>1981</i>
Kandy	24	13	17	39	25
Matale	20	45	73	33	53
Kurunegala	8	4	26	122	111
Anuradhapura	11	12	33	24	55
Nuwara Eliya	—	45	22	62	63
Badulla	7	9	16	28	42
SRI LANKA	236	217	463	641	690

Source: Pesticides in Sri Lanka, Friedrich-Ebert-Stiftung.

The national increase of deaths specific to this cause was 192.4 per cent over the period 1977 to 1981. This increase coincided with the national increase in the use of pesticides. In the Mahaweli area except for Kandy all other districts show a phenomenal increase in deaths due to pesticides. The highest increase was registered in Kurunegala where around a fourteen-fold increase is shown. This district is one of the largest paddy growing areas, in addition to vegetable growing, with very high use of agro-chemicals, is expanding very rapidly in the area. Badulla comes next with a six-fold increase and then Anuradhapura with a four-fold enhancement. Additionally, of the total

deaths due to pesticides in 1981, 16.1 per cent were from Kurunegala whilst Nuwara Eliya registered 9.1 per cent and Kandy 3.6 per cent. At national level too the figures are quite revealing.

In 1986, 57 per cent of admissions of cases of poisoning and 66 per cent of death by poisoning, in the country as a whole were due to pesticide poisoning. It is also indicated that in 1986 pesticide poisoning was the sixth leading cause of death in government hospitals:

Leading Causes of Deaths in State Hospitals, 1986

<i>Diseases</i>	<i>Deaths</i>	<i>Per cent of total deaths</i>
Ischaemic heart diseases	2,585	9.5
Signs, symptoms and ill-disposed conditions	2,140	7.9
Slow, fetal growth, fetal malnutrition and immaturity	1,650	6.1
Diseases of the gastro-intestinal tract	1,581	5.8
Cerebrovascular diseases	1,566	5.8
Pesticide poisoning	1,452	5.8

Source: Ministry of Health. Statistical Division.

Jeyaratnam *et al.* show that between 1975 and 1980 an average of 13,000 people annually were admitted for acute pesticide poisoning.²

Out of this number almost 1000 died. The most common causes of poisoning were attempted suicide registering 73.1 per cent and occupational exposure 17.1 per cent. Fernando too, underscores the fact that the number of deaths from pesticide poisoning was more than the total number of deaths from rabies, snakebites, polio, diphtheria, tetanus, whooping cough and malaria in 1984. Furthermore, he shows that five out of 1000 of agricultural workers are hospitalised for pesticide poisoning³.

Initially, it was only the plantation sector that used pesticides and other agro-chemicals to protect its crops and increase production. But during the last 2–3 decades, the food crop sector has been increasingly using agro-chemicals for the purpose of not only crop protection but

also improving yields. One of the major contributory factors for this increase was the introduction of new improved crop varieties leading to the “seed-fertilizer-pesticide” revolution. Undoubtedly, the use of high yielding seed varieties has multiplied agricultural output but also led to a reduction in genetic diversity of crops and an increase in their vulnerability to diseases and pests. For example, in Sri Lanka there were at least 382 paddy varieties in the past according to historical records. But today about 95 per cent of the paddy area is sown with less than a dozen improved varieties. The traditional paddy varieties now occupy less than five per cent of the sown area.

Within the food sector, the crop using the largest amount of agro-chemicals now is paddy. This crop is grown in an area of approximately 1.3 million acres by about eight million farmers who are widely dispersed over the island with a very high concentration in the Mahaweli area and other irrigation project locations. The paddy output has now more than doubled during the last three decades.

Average Yield of Paddy, 1960–1986

<i>Year</i>	<i>Maha MT/HA</i>	<i>Yala MT/HA</i>	<i>Annual MT/HA</i>
1960–61	1.9	1.9	1.8
1968–69	2.7	2.5	2.5
1978–79	2.8	2.6	2.7
1979–80	3.0	2.9	2.9
1981–82	3.2	3.4	3.2
1982–83	3.7	3.7	3.5
1983–84	3.0	3.1	3.1
1984–85	3.5	3.3	3.4
1985–86	3.6	3.3	3.5

Source: Department of Census & Statistics.

The national average yield during Maha season is about 3.6 tons per hectare compared with the average of about 2.0 tons per hectare in the late sixties. This performance is due mainly to high yielding varieties combined with the intensive use of pesticides and other

agro-chemicals.

Majority of cases of occupational exposures to pesticides are due to the farmers' own carelessness or lack of serious interest in the health hazards that may result from using pesticides without proper precautions. A common observation is that the majority of farmers in the area do not use special protective clothing or other measures when applying agro-chemicals. According to Abeysekera, "neither the cleaning of hands, body and clothing after spraying chemicals and the cleaning of equipment seems to be strictly adhered to. In some instances, it also appeared that they were even in the habit of smoking or chewing betel while handling the sprayer. It was found that the sprayers at times are washed in nearby streams. It was also shown that the empty cans and bottles of pesticides are carelessly disposed of. Most of the farmers seem to be in the habit of disposing of them rather indiscriminately and a few others seem to have sold the empty containers"⁴.

FOOD AND NUTRITION

Rising food prices affect the entire country; its impact is greatest on households which are not engaged in food production but even in food producing households a significant proportion of the food basket is purchased in the open market. The period after 1977 which was also the period when the Mahaweli settlements took place was one of rapid inflation. The food prices according to the Colombo Consumer Price Index increased by approximately 300% between 1977 and 1988.

The general adverse effects caused by the prevailing economic situation can be aggravated in the Mahaweli area because of the accelerated implementation of the project and the rapid influx of large numbers of people. In the early stages of the project the greater part of the food demand even for rice vegetables and other products that would be grown in the area would have to be met with supplies from outside. In this stage the settlers are likely to be specially vulnerable to food shortages, and problems of the new migrants are likely to be compounded by the various factors described in the section on internal migration. As the project moves into full production a large part of the food requirements of the Mahaweli population will be met from the output of the project area itself. This will include rice which is the principal crop, pulses, vegetables horticultural products and live-stock products.



In the diversification programme viable alternative crops are considered in relation to their production potential and markets — national and international. At present the production programme includes soya bean, pulses (cowpea, green gram, black gram), chillies, onions, vegetables (for export), groundnut and fodder etc., under irrigated farming. In the original master plan for Mahaweli, sugar and cotton were also contemplated. Plans in these crops however have not yet been developed. In areas where irrigation water is not available, the growing of economically viable perennials such as coconuts, mango, cashew etc., is to be attempted. In the highland allotments the farmers are encouraged to grow mango, lime, banana, and annual crops such as maize, chillie, vegetables, pulses etc. in the *Maha* season and sesame and cowpea in the *Yala* season for their home consumption. Settlers are also expected to grow five to ten coconut palms per household to meet their consumption demands and supplement their income with the sale of excess nuts.

The diversification programme has no consciously formulated health component: the two major objectives are enhancement of income of farmers and efficient use of land and water. After paddy the farmers prefer to grow chillies as a more secure venture because of better prices and markets. About five or six pickings over a period of seven to eight months are obtained and the income for the chili crop over this period help supplement cash shortages during the paddy off-season. Multiple or mixed cropping enhances production, extends the harvesting period, obtains effective water consumption and maintains soil structure and fertility.

Indirectly, both these objectives improve the quality of life of settlers' households. The higher the income the greater would be the accessibility to better variety and quality of food and higher the calorie intake. Less cash shortages indicate that households have regular meals. The growing of a number of subsidiary crops including fruits and vegetables in the home allotments gives the settlers a regular supply of essential food items at minimal cost. The available information on the nutritional status of the settlers, however, reveals the prevalence of a high degree of malnutrition. The data gathered in the Village Health Project have already been discussed. These are substantiated in various other surveys. The Ministry of Plan Implementation survey of 1981 in the Mahaweli H-area points to the high prevalence of chronic malnutrition. The rates are indicated in the following page.

**Prevalence of Protein — Energy Undernutrition
amongst Pre-school Children (6–59 months)**

<i>Area</i>	<i>Acutely Undernourished¹ percent</i>	<i>Chronically Undernourished² percent</i>
H — 1	12.5	37.5
H — 2	17.7	38.5
H — 4	22.5	25.5
H — 5	20.4	32.1
H — 7	21.0	24.7
H — 9	15.6	28.9
Area as a whole	19.6	30.4

1. Weight-for-height: 80 per cent of NAS Reference median

2. Height-for-weight: 90 per cent of NAS Reference median

Source: Ministry of Plan Implementation Report.

It should be noted that the new settlers in the H-area were largely from economically disadvantaged groups which were nutritionally at risk and subject to chronic undernutrition before they migrated to Mahaweli. The very high level of acute malnutrition however suggests severe undernourishment, ill health and subnormal food intakes in the more recent past and present.

The conditions which have contributed to the high level of malnutrition among the Mahaweli settlers need closer investigation. The government policy of distributing equal allotments of land to the settlers has ensured that the distribution of land in the scheme is equitable. The size of allotment is based on estimates of cost and benefits of production which indicate that settlers would be able to obtain a reasonable farm income. The crop mix of farmers on both irrigable and highland allotments can provide a substantial proportion of their food needs. The conditions are therefore favourable for the elimination of malnutrition.

THE MAHAWELI ENVIRONMENT

In most cases environmental issues are very closely related to development policies and practices. The Mahaweli programme too, has specific policies and guidelines to protect and control the degradation of the environment. Such policy issues become imperative because of the intimate relationship of the settlers' health and the quality of the environment they live in. In the Mahaweli programme, it appears that the major direct concern is not with the health implications as much as with the deforestation that is taking place and its impact on the environment. The determined policy orientation towards the goal of self-sufficiency in food has certainly led to agricultural extension having a strong impact on the environment. In this context it has been argued that the rapid extension of the Mahaweli areas has resulted in the degradation and depletion of forests and soils, loss and quality changes of surface and ground water leading to water-logging, salination, siltation, reduction in genetic diversity, soil, water and air pollution and entrophication.

Undoubtedly, there had been extensive forest clearance under the Mahaweli programme. It must, however, be underscored that such activities are of comparatively recent times, carried under controlled conditions to some degree, in the dry zone which has a flat to gently rolling topography. The rainfall is seasonal. Deforestation in the area had been planned with ample protected forest area and reserves to maintain some degree of ecological balance. It is, however, too early to arrive at any definite conclusions as to salination, siltation and changes in the surface and ground water. The creation of new water bodies and changing of river courses have created newer riverine areas completely changing the previous environment. Over the long-term, irrigation without proper water control and management, salination etc. can occur but in the short run there is little cause for alarm. Furthermore, with the use of more recent scientific knowledge and new engineering techniques it is doubtful whether Gal Oya conditions would be duplicated in the Mahaweli area.

On the other hand, health effects are more significant in this case because of its extensiveness and concentrated large population. However, clearing of forests naturally leads to a change in the micro climate of the area and to the invasion of insects and pests adapted to open drier terrain. In the Mahaweli area there can be an increase in health problems associated with snake bites, malaria, filaria, leptospirosis etc. and of course, there could develop new diseases with

the colonisation of new species of insects, pests etc. But a more significant factor that can affect both the health and the environment of the Mahaweli area is the use of modern agricultural techniques. Besides the use of numerous heavy equipment which can alter the environment structure, the use of pesticides and other agro-chemicals has become a great environmental hazard. There is much evidence to show that Mahaweli farmers with the desire to improve their income are using fertilizers and pesticides far above the actual requirements and frequency. In fact, this is a common feature among most farmers in the country. In this respect Abeyasekera's findings on the indiscriminate use of pesticides are:

- a) frequency of application has increased (more than the minimum of seven-day interval);
- b) application of dosages higher than what is usually recommended. The farmers are of the opinion that the recommended dosage is inadequate for effective pest control;
- c) improper methods of application: disregard to instructions given;
- d) non-adherence to safety measures;
- e) improper time of stoppage of application (should stop two weeks before harvesting); and
- f) poor storage.⁴

Increase in the frequency of application and higher dosages means an over-use of fertilizers etc. Such practices, over time, causes excessive nitrate levels on ground water and even nitrate run-off can lead to entrophication of surface water. Pollution of HO and soil not only damages the ecology of agriculture but also the ecological equivalence of the environment. In addition, over-use of pesticides and other agro-chemicals lead to overexposure of the farmers to chemicals which, as discussed earlier, is now a significant health hazard, in addition to higher chemical residues in food and the environment. The present indiscriminate use may give phenomenal results over a short period of time but in the long run such use can destroy the natural predators and other non-vulnerable species and also increase the resistance of the very insect pests the farmers wish to eradicate. The Mahaweli settler farmers have much to learn about the use of agro-chemicals, and there are no specific policy guidelines. In this respect the UNEP recommendation is relevant and must be

emphasised: "The use of fertilizers and pesticides has to be guided *inter alia*, through training, awareness building and appropriate price policies, so as to establish integrated nutrient supply systems responsive to environmental impacts. Similarly, subsidies, which have led to the over-use or abuse of chemical fertilizers and pesticides, have to be phased out."

In its overview of the health situation the Ministry of Health has this warning to give: "As the population of the Mahaweli area increases, the traditional defecation practices will lead to high transmission of water and food-borne diarrhoeal diseases such as gastroenteritis, bacillary dysentery, amoebiasis and typhoid. These will increase from the outset because of the lack of safe water supplies and excreta disposal facilities. Hence, the provision of adequate supplies of safe water, sanitary latrines and proper permanent housing are priority health needs of the area. Equally important is the training and education of settlers on protecting the living environment."

CONCLUSION

In an overall assessment of the performance of the project in terms of health development, the outcomes have been positive for an effort of this unprecedented magnitude with the numerous complex human problems that it faced. This performance was possible because the project was able to benefit from the vast experience it had accumulated from the implementation of similar land settlement projects over a period of nearly four decades. The main components of a multi-sectoral irrigation and land settlement project, which have implications for health, as illustrated in the Mahaweli project are summarised below:

(i) Organisation

From the outset the organisational structure lent itself to integrated multi-sectoral implementation. Within such a structure it became possible to identify the main economic and social components and clearly define the responsibilities within a multi-sectoral programme. Many activities of line Ministries which were organised vertically could be coordinated horizontally as in the Village Health Project.

ii) Internal Migration

Most of the health-related issues of the project arise from the massive transfer of the population to new habitats. Some of these aspects are

likely to escape attention unless there is a systematic identification of the possible health effect of the different aspects of the migration. These are:

- the stresses of adapting to a new environment; changes in food habits and access to food resources; new climatic conditions demanding changes in life styles;
- exposure to new diseases in the new habitat as well as introduction of diseases, endemic in the old habitat, to the new one.
- the age structure of the population (Many families are in their peak reproductive age and have already demonstrated the potential for large size families. The selection criteria have brought together a population group which requires special family planning interventions. This becomes particularly important in relation to the acute problems of second generation settlers and the lack of economic opportunities which have already become evident in older settlement schemes).
- social dislocation. (The age composition also draws attention to other features such as the possible skewed distribution of age groups; the ratio of young to elderly, the extent of dependency, and their social implications for the growth of a balanced community life and inter-generational relationships. The supportive networks available in the original habitats through extended families and kinship are most often non-existent in the new settlement).
- early stage of settlement. (This is the most vulnerable phase; settlers are likely to migrate without their families; most housing will be temporary; even after the families join them in the initial phase there are likely to be food shortages and high food prices until the project is in full production; the infrastructure for health and other basic services will not be fully developed).

(iii) Food and Nutrition

Some of the impacts are already mentioned under international

migration. The Mahaweli settlements will be subject to the same effects of macro-economic policies as the rest of the population. These include the effect of macro-economic and sectoral policies on food prices, and household purchasing power. These effects can get accentuated owing to the special circumstances of the settlers, particularly in the early stages of the settlement as already indicated. The crop-mix and the utilisation of highland allotments can be planned to meet the objectives of agricultural diversification and farm incomes as well as those of nutrition.

The nutritional status of the Mahaweli settlers has given cause for serious concern. The combination of very low infant mortality with high levels of acute and chronic malnutrition has perplexed health professionals and nutritionists. A recent evaluation has this comment to make: "Research is required on the baffling findings of the residual high levels of undernutrition which according to the accepted theory is incompatible with the remarkably low IMR."⁵ The selection criteria have resulted in a concentration of population who have been drawn from groups who were suffering from malnutrition prior to migration but who are relatively better educated than the average. The potential for programmes of health education and changes of behaviour for improvement of nutritional well-being is high.

iv) Technological Change

These include the effects of irrigation and forest clearing and the transmission of water-borne diseases, the recrudescence of malaria; special problems which arise as a result of the efficient and far-flung irrigation network which also becomes a carrier of infection, faecal pollution and the effects of poor environmental sanitation; the use of agro-chemicals, pesticides weedicides fertilizers, on agricultural workers, farm households and consumers of agricultural produce; the health effects of mechanisation on the quality of the agricultural occupation — reduction of fatigue — intensive operations on the one hand and the risks of injury and accident on the other.

v) Agricultural Policies in General and their Impact on the Mahaweli Project

The health impact of the Mahaweli project has to be seen in the context of the agricultural strategy as a whole and placed in the context of the analytical framework for health policy analysis in the agricultural sector as presented in the case study on that subject. The

issues mentioned there which relate to import substitution in rice and the diversification of agriculture apply to the Mahaweli project. The pattern of agricultural development which leads to the expansion of non-farm employment, the growth of agricultural processing and the promotion of rural and small-scale industrialisation will have special relevance for the problems of the second generation which have become acute in older settlement schemes and which can produce highly vulnerable and disadvantaged groups. (Exhibit 1 presents the Mahaweli scheme's effects and impacts in a schematic framework. See also Exhibits 2–4 which present salient information on the health care system and its coverage in Mahaweli).

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EXHIBIT 1
The Mahaweli Project Health & Related Impact

<i>Project Activity & outcome</i>	<i>Health & Related Impact</i>
1. Design and Organization	Design of organizational structure of multi-sectoral implementation. Responsibilities defined, main economic and social components identified within programme. Line ministries coordinated. eg. Village Health Project.
2. Settlement Internal Migration	Large scale transfer of population from one habitat to another. Changes in resource base and resource use, endemic diseases. Stress in adapting to new environment. Food availability changed, habits had to change. Exposure to new habitat associated disease. Carry disease from old habitat. Age structure of settlement favours those at peak reproductive age. Higher ratio of young to old.
3. Early Stage of Settlement	Skewed population distribution Loss of familiar social networks. Housing Temporary. Food costs high. Infrastructure for health and basic services not fully developed.

4. Consolidation.
Impact of National Policies

Favourable impact of those which support prices of crops grown in the settlement, raise prices of competing food products.

Unfavourable impacts from changes in macro economic and sectoral policies that lower purchasing power, raise input prices.

Changes in the transfer and subsidies to agriculture sector.

Impact through earning and income of the agricultural producers and price for agricultural goods.

The nutrition status of the Mahaweli Settlers is a cause for serious concern. The educational attainments of the settlers has contributed to high infant and maternal survival, but those selected from poor and deprived groups more likely to have been mal-nourished prior to migration.

Good potential for changes in behaviour for nutritional well-being.

5. Technological Change

The irrigation system is an efficient, new method for transmitting disease. Lack of toilets, use of the canals for cleaning.

Use of organic fertilizers, weedicides, pesticides at high levels. Possibility of contamination and poisoning.

Injury from farm equipment, threshers etc.

6. Agriculture Policies

Commercialization, move away from subsistence to market production. Diversification. These factors affected by technology, change employment and incomes from agricultural production.

Changes in food self-sufficiency at household level. Nutrition affected by prices and monetary factors.

EXHIBIT 2

Key Health Personnel in the Mahaweli Districts, 1987

District	(1)			(2)			(3)			(4)			Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health Inspectors	Public Health Nursing Sisters	Medical Officers of Health	Registered/ Assistant Medical Practitioners	Nurses	Public Health 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*Rate per 100,000 population

1. Includes specialists
2. Excludes Medical Officers of Health (given separately)
3. Includes Regional Dental Surgeons
4. Excludes Pupil Nurses

Source: Medical Statistics Unit.

EXHIBIT 3
Immunisation Coverage of Infants in Mahaweli Districts, 1987

R.D.H.S Division	BCG		DPT 3		DPV 3		Measles		TT + B	
	Coverage %	Rank	Coverage %	Rank	Coverage %	Rank	Coverage %	Rank	Coverage %	Rank
Kandy	73.9	14	82.3	10	85.2	8	70.0	7	46.0	12
Matale	84.3	4	82.6	9	83.4	10	72.1	5	71.3	2
Nuwara Eliya	52.6	19	57.6	16	57.2	18	51.9	16	31.4	20
Trincomalee	12.4	21	19.2	20	24.5	21	6.3	21	11.0	21
Kurunegala	80.0	8	92.0	5	96.2	2	59.2	11	52.7	8
Anuradhapura	80.9	6	95.2	3	93.8	5	70.8	6	66.6	4
Badalla	71.5	15	68.2	13	68.4	13	55.4	14	46.2	11

EXHIBIT 4

Utilisation of Medical Institutions in the Mahaweli Districts, 1987

	Teaching Hospitals			Provincial Hospitals			Base Hospitals			District Hospitals		
	Duration of stay	Bed turn-over rate	Occupation rate	Duration of stay	Bed turn-over rate	Occupation rate	Duration of stay	Bed turn-over rate	Occupation rate	Duration of stay	Bed turn-over rate	Occupation rate
Kandy	6.9	54	101	—	—	—	7.7	51	108	4.0	62	67
Matale	—	—	—	—	—	—	4.5	72	91	3.6	123	120
Nuwara Eliya	—	—	—	—	—	—	4.9	80	107	3.9	49	52
Trincomalee	—	—	—	—	—	—	5.4	65	97	4.6	85	107
Kurunegala	—	—	—	6.8	58	109	4.0	86	96	3.0	99	81
Anuradhapura	—	—	—	5.3	76	110	—	—	—	3.4	95	88
Polonnaruwa	—	—	—	—	—	—	6.1	87	147	2.6	78	56
Badulla	—	—	—	5.8	72	113	—	—	—	4.2	66	76

Bed turnover rate: The number of times a hospital bed, on the average changes occupants during a period.

* Excludes De Soysa and Castle Street Maternity Hospitals,
Lady Ridgeway Children; Hospital and Eye Hospital.

** Includes Maternity Homes in-charge of Midwives.

EXHIBIT 4 (Contd)

Utilisation of Medical Institutions in the Mahaweli Districts, 1987

	Peripheral Hospitals			Rural Hospitals			CD & Maternity Homes		
	Duration of stay	Bed turn-over rate	Occupation rate	Duration of stay	Bed turn-over rate	Occupation rate	Duration of stay	Bed turn-over rate	Occupation rate
Kandy	4.6	76	96	4.6	58	72	4.2	10	11
Matale	3.9	80	85	3.4	51	46	2.5	7	4
Nuwara Eliya	4.9	53	71	4.8	54	71	5.8	13	21
Trincomalee	5.0	95	130	—	—	—	2.9	20	15
Kurunegala	3.3	94	86	3.5	86	82	4.4	19	23
Anuradhapura	2.7	105	77	3.4	87	82	4.1	13	15
Polonnaruwa	2.4	176	114	0.9	114	90	2.6	16	11
Badulla	4.4	71	84	5.5	34	51	5.1	10	14

THE SEDAWGYI MULTIPURPOSE DAM AND IRRIGATION PROJECT

INTRODUCTION

There is little doubt that development projects like the construction of irrigation dams are vital to the socio-economic development of countries like Myanmar, where the economy is heavily reliant on agriculture. It is also true that development results in change and although positive changes are envisaged and planned for, negative effects also emerge. Hence, in development, one is faced with a cruel dilemma, whereby progress and prosperity is usually accompanied by misery and squalor. History is full of myriad examples in which development changes resulted in introduction of new diseases and the spread of old ones.

At the same time, it should be recognized that measures can be adopted which minimize such adverse effects. Proper attention has to be given to the unintentional negative health consequences of development policies. This requires systematic planning efforts as well as close intersectoral collaboration and cooperation. Health administrators must have the power, interest and initiative to become involved in national policy-making.

In this mini case-study, the situation relating to Sedawgyi multipurpose dam and irrigation project in Myanmar will be presented and discussed to illustrate the health impacts of development policies. The main thrust of the case study is the development of a conceptual framework which reveals not only the relational aspects but most

This case study was prepared by Aung Tun Thet. It is intended as the basis for discussion rather than to illustrate either effective or ineffective handling of an administrative situation. Funds for its preparation were provided by a grant from WHO. Case 1.5.

importantly the possible intervention strategies for negating the adverse effects. It is hoped that this conceptual framework will facilitate fruitful discussions.

SEDAWGYI MULTIPURPOSE DAM AND IRRIGATION PROJECT

Sedawgyi dam site is located in Madaya township 46 miles north-east of Mandalay city. The Chaung-magyi river provides the water resource for irrigating 127,000 acres of cultivated land and enables electrical power generation of 25 megawatts.

The catchment area above the same site is 3,000 square miles and is thinly populated, thickly forested and malarious. The basin area impounds 363,000 acre feet of water at full reservoir level and 84,000 acre feet at lowest level. The water for the irrigation fields flows from the reservoir through a system of earth canals.

With the completion of the dam, since the reserved forest lands were submerged under about 27 square miles of reservoir, forest-land had to be cleared of available forest. The extraction and milling activities involved a large work force moving into the area and since the area is highly malarious, many workers suffered from the disease. During the construction stage, other workers engaged in the construction of the dam were also effected.

DISEASES AND HEALTH SERVICES IN SEDAUGYI PROJECT AREA

Health services are delivered in the project area mainly through a dispensary which is staffed by three doctors and six nurses. Patients are referred from this dispensary to Madaya Township Hospital located 24 miles away and the next level of referral is the Mandalay General Hospital which is about 46 miles away.

The major health problem in the project area is malaria. Diarrhoea, dysentery, viral hepatitis, anaemia, malnutrition and respiratory tract infections are among the leading causes of morbidity and mortality. The prevalence of water-associated diseases in the Madaya Township was as shown in the following page.

The Sedawgyi Multipurpose Dam and Irrigation Project

**Water-associated Diseases in Madaya Township
(Cases/deaths)**

<i>Year</i>	<i>Diar- rhoea</i>	<i>Dysen- tery</i>	<i>Food poison- ing</i>	<i>Ty- phoid</i>	<i>V.H</i>	<i>Malaria</i>
1976	131	63	27	6	16	314
1977	210	209	3	3	86	222
1978	223	63	4	1	14	449
1979	629/9	53	—	22	12	1216/31
1980*	492/9	113	9	38/1	9/1	1679/53

Malaria case detection in Sedawgyi project area was as under:

Malaria Case Detection in Sedawgyi Area

<i>Year</i>	<i>Population contacted</i>	<i>Blood smears taken</i>	<i>Results</i>		
			<i>Positive</i>	<i>p.f.</i>	<i>p.v.</i>
1978	36,008	1,500	142	118	42
1979	40,767	1,927	139	125	14
1980	100,886	1,670	145	139	6

Case detection and treatment of malaria and regular spraying operations with DDT are carried out on a regular basis. Entomological surveys of the area show presence of anopheline species. Of these *A. minimum* and *A. balabacensis* are the only vectors for malaria and *A. minimum* is more susceptible to DDT spraying.

More recent figures from 1980 to 1988 show a dramatic drop in out-patients with clinically suspected malaria from 1985 onwards as seen in the next table. On the other hand it should be recognised that the yearly number of patients in the periods after 1985 is only about

half that of the periods before. At the same time, the in-patient numbers as well as CFR have not changed significantly.

**Clinically Suspected Malaria (CSM) Cases
in Madaya Township (1980–1988)**

Year	Out-patients		In-patients		Total No. of deaths due to malaria	Case Fatality Rate (CFR)
	Total patients	% of CSM	Total patients	% of CSM		
1980	60,517	9.57	2,235	26.76	30	5.02
1981	74,873	18.45	2,287	35.15	29	3.61
1982	86,878	15.98	1,926	29.07	12	2.14
1983	129,932	19.81	3,092	30.01	22	2.37
1984	144,087	23.86	3,583	29.78	26	2.44
1985	50,320	7.57	2,214	23.35	15	2.90
1986	37,073	8.63	2,016	20.04	15	3.71
1987	51,608	5.10	2,017	21.07	11	2.59
1988	59,209	6.72	2,662	17.28	6	1.30

Why did the OPD situation change? Was it the impact of the integrated approach for malaria control adopted in this area? Or was it due to the fact that the people who had moved into the project area moved out? It was probably a combination of both these factors.

CONCEPTUAL FRAMEWORK FOR ANALYSIS

Every problem in society has its causes and any plans for reducing or alleviating the problems must be based upon the assessment of the problem and an analysis of its causes. Often, although the existence of a particular problem is agreed upon, there may be disagreement on what causes the problem. This disagreement stems mainly from the fact that the problem is considered from different conceptual approaches.

Hence, it would be necessary to spell out explicitly the conceptual framework which evolved from this case-study.

A conceptual framework for the case study is shown in Exhibit 1. It enables one to identify and understand the causes of the problem. The probable causes of mortality and the interlinked causative processes are shown. The framework can also be used in the selection of design of intervention strategies.

Deaths due to malaria are the final result of a long chain of inter-linked causes. The deaths themselves are merely *manifestations* of the situation. The *immediate* cause of deaths is primarily the transmission and incidence of malaria. Effects of the disease include loss of productivity for the patients concerned, and additional burden of medical care for the community.

At the next level, it is possible to identify the underlying causes leading to the immediate causes. The main cause is the creation of new environments as the result of the large-scale developmental project. This would in turn result in large-scale in-migration. The migrants coming from different parts of the country aggravate the situation by providing increased number of sources of infection, especially when they come from non-malarious areas and have no immunity to malaria. The type of crops, method of cultivation and the type of country where it is grown will also have a significant effect on the disease pattern. Furthermore, the pattern and distribution of water-associated vector-borne diseases will vary with the type of irrigation employed. Clearing the jungles for construction of the dam would also lead to propagation of a new vector due to the changed environment.

These underlying causes in turn result from a number of basic causes: the development strategies, the economic structure and the political and ideological superstructures necessitated by the large-scale development projects.

To address the immediate causes and underlying causes, a combination of chemical control, biological control and environmental control measures may be adopted. Chemical methods are still the main weapon for the control of vector-borne diseases. This involves residual spraying, space spraying and larviciding. Biological control is one component of an integrated pest control system and involves the direct or indirect manipulation of the natural enemies of pest species so as to increase mortality among the pest population. It would be obvious that these measures still need to be augmented and in some cases replaced by chemotherapeutic protection of individuals, and

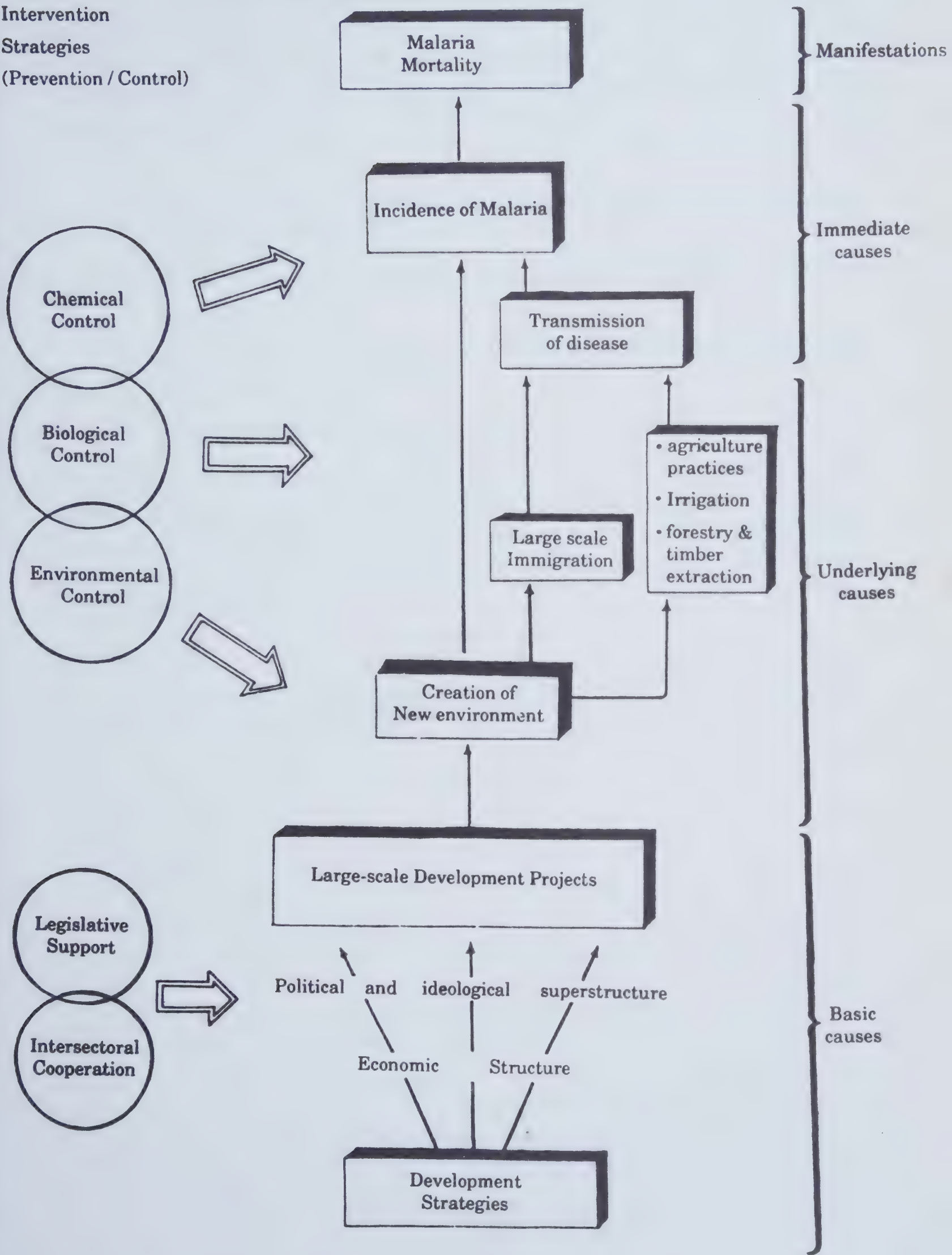
effective and prompt curative treatment.

Environmental management for vector control is a time-honoured method of vector control which has regained prominence especially with the increasing cost of insecticides and the pollution of the environment by insecticides, and the development of resistance of disease vectors to insecticides. This includes environmental modification, environmental manipulation and reduction of man-vector-patrogen contact.

A comprehensive approach must be adopted, one where the selection and application of the methods of control lead to optimum achievement of results. Control methods must be considered and selected in order to formulate an optimal or cost-effective strategy. At the same time, opportunities must be availed to take advantage of the "spill-over", i.e. operations intended for the control of one disease which incidentally produce considerable positive effects in the control of other diseases.

To confront the basic causes, it would require effective and efficient intersectoral cooperation and legislative support. The need to include legal requirement for inclusion of a health component for any developmental project is self-evident, but is nevertheless an issue which is often overlooked. The key in this whole issue is intersectoral collaboration and cooperation. Ambitious development plans conceived of and drawn up in different ministries or departments often lack the awareness and recognition of the health impacts of such plans. This results in the creation of health problems, intensification or introduction of diseases which may even defeat the very purpose of the development efforts. Ironically, many of these health hazards can be minimized by intersectoral collaboration at the beginning of the planning phase and continuing throughout the duration of the development project. It should also be remembered that intersectoral cooperation between health and other services is an integral part of the Primary Health Care approach as defined by the Alma Ata Conference in 1978. There is little doubt that there are numerous activities in sectors other than health that produce substantial improvements in the health status of the people. In this context, the pursuit of equity in health should be the central aim of intersectoral cooperation. Thus the health sector can legitimately contribute to social and economic development.

EXHIBIT 1
CONCEPTUAL FRAMEWORK FOR THE CASE STUDY



CONCLUSION

In this short case-study the situation relating to a developmental project in Myanmar is presented and in the light of these findings, a conceptual framework has been developed. The central theme of the study is the linkage between developmental policies and negative health outcomes, and the initiation of policies to prevent such outcomes. This requires:

- I. Improvement of policy analysis, health impact assessment and monitoring skills.
- II. Improvements of efforts to identify and adjust hazardous policies.
- III. Improvement of design and implementation of prevention and control programmes.
- IV. Improvement of policy promotion on an international level.¹

National commitment of health concerns must be increased and policy changes must occur to help reduce the negative impact of development policies in health. This in turn requires the development of the necessary institutional linkages and the promotion of intersectoral cooperation.

REFERENCE

1. *Health Impacts of Development Policies* – Issue Paper for WHO/World Bank Joint Initiative, 1988. Harvard School of Public Health.

SCHISTOSOMIASIS ERADICATION: CASE OF SULAWESI, INDONESIA

GEOGRAPHY AND POPULATION

Lindu Valley in the district of Poso and Napu-Besoa Valley in the district of Donggala are two areas in Central Sulawesi known as endemic of schistosomiasis. The existence of schistosomiasis in Lindu Valley was first identified by Muller and Tesch in 1937. The valley, with a size of 100 square kilometers, located 950 meters above sea level, surrounds lake Lindu. The valley is isolated and it takes 4 hours' drive plus 4 hours' horse ride to reach the area from Palu, the capital city of the province. The forest surrounding the lake is protected and supervised by the Forestry Department. However, there have been some activities in the northern shore of the lake to exploit the lumber. The lake's water flows through Gumbasa river which run to the west along the valley of Palu. A feasibility study has been under way for a power plant construction using the river's water. Lindu Valley is inhabited by around 3,000 people distributed in 7 villages.

Napu-Besoa Valley, which is located 50 km to the south of Lindu, has an area of 7,000 square km. Identification of schistosomiasis in this valley was made by Carney *et al.*, in 1972. This valley is about 1,200 meters above the sea level and quite fertile for agriculture, especially for rice fields. There are many water springs in the Napu area, which form the river of Lariang, flowing south across the valley. The number of villages in Napu-Besoa are 20, inhabited by around 7,000 people.

This case study was prepared by Ascobat Gani and Ronnie Rivany, Faculty of Public Health, University of Indonesia, Depok. It is intended as a basis for discussion rather than to illustrate either effective or ineffective handling of an administrative situation. Funds for its preparation were provided by a grant from WHO. Case 1.6.

Although the valley is also isolated, it is more accessible than Lindu valley since four-wheel vehicles can reach many of the villages in the valley.

The natives of the two areas are of Kaili tribe, mostly Christians, and work as traditional rice farmers. They use buffalo to plow their wet rice field. Each farmer usually has a considerable size of land and, therefore, although the rainfall actually allows them to cultivate rice twice a year, most farmers cultivate their land only once.

In the period of plowing the land and planting the rice, Kaili people stay in small huts constructed in their rice field. During this time, most villages are empty. They return to their villages on Saturday and go to Church on Sunday.

Dogs, cattle, buffaloes and horses are common animals raised by the valley's people. They use the dogs for hunting deer and wild pig in the nearby forest. The people in Lindu also do fishing for domestic consumption.

In addition to the native Kaili tribe, there are local transmigrants coming from the neighbourhood Kuwali sub-district. Local transmigration was initiated by the Kuwali subdistrict officer, who in 1959 brought 15 families to the village of Puro and Owo in Lindu. In 1962 and 1967, more families were brought to the villages. In 1988 their number has reached upto 500 individuals. These transmigrants are Bugis people. They are Muslims and mostly work as fishermen in the Lindu lake. The catches are sold to Palu.

EPIDEMIOLOGY

BIOLOGICAL CYCLE AND TRANSMISSION

So far only three species of *Schistosoma* are known to be infective to human: *S. Mansoni*, *S. Hematobium* and *S. Japonicum*. Two of these species (*S. Mansoni* and *S. Japonicum*) stay in the blood vessels of intestine, and *S. Hematobium* stays in the blood vessels of the bladder. The parasites lay eggs in the blood vessels and penetrate the wall to enter the intestinal lumen or urinary bladder. Therefore, in the infected person, eggs can be found in his faeces and urine.

In the water, an egg is hatched and its miracidium is released. The hatching process usually takes place in clean water, and is stimulated by sunlight. The miracidium swim in the water to find its vector host.

The vector host of the parasite is also specific for each species. The vector for *schistosoma mansoni* is the snail belonging to the species of Biomphalaria. The vector for *schistosoma hematobium* is species Bulinus and the vector for *schistosoma japonicum* is Oncomelania. In the snail the miracidium experience a sexual reproduction to produce cercaria. One miracidium may produce around 100,000 cercaria.

The cercaria are released into the water and stay there until they are exposed to the host reservoir. When it is exposed to the human or mammalia skin, the cercaria penetrate the skin and enter the blood vessels and find its way to reach the liver. The parasite finally reaches adult stage of its development in the liver. The adult worm further migrates to the veins of intestine or urinary bladder and start a new cycle by laying its eggs.

In Lindu area, 13 of the 22 species of mammals examined were found infected. The most prevalent ones were cats, dogs, rats, skunk, wild pigs and deer. Less prevalent than those mammals were water buffalo, cattle and horses. It is quite possible that the animal-cycle also plays an important role in the transmission of schistosomiasis in the area.

INCIDENCE AND PREVALENCE IN MAN

As mentioned above, Muller and Tesch were the first to confirm the existence of *S. Japonicum* in Lindu in 1937. They found a prevalence of 8% from a sample of 98 faeces specimens taken from Lindu area. Bonne and Sandground repeated the study in 1940 and found a prevalence of 53% from a sample of 176 faeces specimens.

A complete census was undertaken in Lindu in 1972. 251 families were recorded in the census with a total population of 1,515. Among these people the prevalence of schistosomiasis was 37.5%. The prevalence rates varied among the villages in Lindu. For example, data from two villages showed a prevalence of 70.5% and 53.7%.

The prevalence rate in Napu Valley in 1972 was 43% based on faeces examination. The survey was done in a sample of 5 villages in the area. The highest prevalence was found in one village, which was 67%.

Since 1981, a regular surveillance has been done to monitor the progress of the schistosomiasis eradication programme. The surveillance covered almost all villages in the two areas and were carried

out twice a year. As shown below, there has been considerable reduction in the prevalence, both in Lindu and Napu Valleys. A significant drop in prevalence was observed in Lindu in the second semester of 1982: from 17.7% to 2.08%. Thereafter, prevalence has been unstable, with occasional slight increase in 1984 and 1986.

**Prevalence of Schistosomiasis in Humans: Lindu and Napu,
1981-1989
(in %)**

<i>Year</i>	<i>Semester</i>	<i>Lindu</i>	<i>Napu</i>
1981	I	—	—
	II	17.70	—
1982	I	2.08	23.10
	II	1.71	—
1983	I	—	22.90
	II	1.90	2.69
1984	I	—	2.88
	II	3.81	4.54
1985	I	1.73	2.19
	II	2.39	1.38
1986	I	3.33	0.84
	II	1.70	0.91
1987	I	0.56	2.41
	II	0.70	0.94
1988	I	1.23	0.76
	II	1.49	2.69
1989	I	—	1.83

A similar pattern is also observed in Napu valley. A big drop in prevalence was observed in the second semester of 1983, i.e. from 22.9% to 2.69%. Again, a fluctuating rate of prevalence has also been observed.

Hadidjaja (1982) conducted a study in the village of Langko and Owo in Lindu Valley. He found quite high prevalence rates in the two

villages: 53.7% and 61.1% respectively. He further found that very young children (as young as 1.5 years) were also infected by schistosomiasis.

INCIDENCE AND PREVALENCE IN THE VECTOR HOST

Although investigation had been done since 1942 to find out the species of snail transmitting the disease (Bonne *et al.*, 1942), the confirmation came only in 1971 when Carney *et al.*, identified *Oncomelania Hupensis* as the vector. The snails are widely, but focally, distributed throughout the Lindu Valley. The colony of the snails can be found near the cultivated fields, abandoned farming areas and in the virgin forests surrounding the lake. Most of the colonies identified were located in the western and northern sides of the lake. In 1980, there were over 70 colonies already isolated. The eastern side has not been surveyed intensively due to limited accessibility. As a matter of fact, the eastern side is uninhabited.

In the Napu Valley, a number of 15 colonies were isolated. In this area, the snails were found in the open and grassy areas which surround the north-south and east-west trails in the valley. These trails are used by humans as well as wild and domestic animals.

Eradication of the colonies has been attempted in Lindu since 1976 and in Napu since 1984. The effectiveness of this programme is evaluated by examining the prevalence of schistosomiasis infection in the snails. The following table indicates that the prevalence rate has been fluctuating.

Prevalence of Schistosomiasis Infection in Snails
Lindu and Napu Valleys, 1983-1988
(in %)

<i>Year</i>	<i>Lindu</i>	<i>Napu</i>
1983	0.00	4.20
1984	1.37	2.90
1985	3.02	2.80
1986	2.12	1.10
1987	0.00	1.90
1988	0.30	4.00

Dazo *et al.*, (1976) reported that the fluctuation had been due to seasonal variation with the highest rate in October (5.7%) and lowest in January (0.0%).

INCIDENCE AND PREVALENCE IN THE RESERVOIR HOST

Rats, cattle, dogs, wild deer, skunks and wild pigs are animals known as the reservoir of schistosomiasis in Lindu and Napu– Besoa. In 1988, an examination was done to estimate the infection rate among domestic animals and rats in Lindu and Napu. As shown below, infection among dogs is quite high, i.e. 10% in Lindu and 30% in Napu. Rats and domestic pigs are two other animals also highly infected in Napu area, with an infection rate of 26% and 20% respectively.

Infection Rate of Schistosomiasis in Animals Lindu and Napu 1988 (in %)

	<i>Lindu</i>	<i>Napu</i>
Rats	3.30	18.40
Dogs	10.23	31.58
Cattle	2.00	8.33
Water buffalo	0.00	1.35
Pigs	0.00	20.00
Horses	0.00	0.00

A special examination of infections among rats had been done since 1982 both in Lindu and Napu. Until 1988, rats' examination had been done six times in Lindu and ten times in Napu. The trend of the infection rates is given in the following table. It shows that the rates fluctuated over time and even increased significantly in Napu area.

Infection Rates in Rats in Lindu and Napu
1982-1988
(in %)

Survey number	Lindu	Napu
I	6.2	9.9
II	2.3	5.9
III	9.2	5.1
IV	0.0	8.9
V	0.0	7.5
VI	3.3	17.6
VII	—	15.2
VIII	—	7.2
IX	—	17.3
X	—	18.4

Note: Survey number does not denote the time of survey.

FACTORS SUPPORTING THE TRANSMISSION

Several factors support the transmission of Schistosomiasis in Lindu and Napu. First is the fact that rice farming is the main job of people in the area. Exposure to infected water is unavoidable. Furthermore, once a year cultivation of rice allows the snails to grow in number. The farmers also use water buffalo to plow the farm. As mentioned above this animal is also infected. In addition, rice farm usually is a good place for rats to live.

The second factor is the habit of defecating in open area. Very few households have latrines. According to a survey conducted in 1988, almost none of the households in Lindu had latrines. In Napu, 46% of the households owned their latrine and in Besoa, only 14% owned their latrines. The total number of households having latrine in the three areas was 322, i.e. only about 25% of the total 1,308 households. Upto 1988, there were 209 latrines constructed as part of the eradication programme. This showed unwillingness on the part of the community to build latrines on their own initiatives. The survey also found that the constructed latrines were poorly maintained and many were not utilized.

The third factor supporting the transmission is the high rate of infection among domestic animals, especially dogs and pigs. These animals are not kept in cages or ranches, but are allowed to wander around in the villages.

CONTROL PROGRAMMES

SEARCHING FOR AN EFFECTIVE CONTROL

Although schistosomiasis had been recognized in the areas since 1937, a systematic approach was not adopted until 1972, to find out an effective method for controlling it. The search for the method lasted until 1980, and it was in 1981 that the implementation of the control programme started in Lindu and in 1982 in Napu.

The search for the control method was undertaken in the form of a pilot project. The Department of Health, with assistance of WHO, started the project in three villages in Lindu, two for intervention and one for control. There were three strategies tried: environment modification, snail eradication and treatment of infected humans.

The environment modification was done by constructing small irrigation and drainage systems for the rice field in the two villages. This system was expected to help in accumulating snails in its side so that molluscicide can be used more effectively. The problem observed in this method was one of maintaining the irrigation system, which was not done properly by the villagers. A water supply system was also constructed. The system distributed clean water from a nearby mountain to a reservoir tank constructed in the middle of the village. In addition, several public latrines were also constructed. It turned out that the people in the villages continued to prefer using open area or nearby creeks. The eradication of snails was done by monthly spraying of Bayluscide at the snail colonies. Treatment of infected persons was also done. The drug used for the treatment of 190 cases was Niridazol.

The evaluation of the three strategies indicated that in the villages with intervention, schistosomiasis prevalence had dropped from 71.3% to 26.4% : a reduction of 44.9%. In the control village, reduction of prevalence was also observed, but much less than that in the intervention villages. The drop was from 54.5% to 44.0% or only 10.5% reduction.

MODIFICATION AND ADOPTION OF THE STRATEGY

Experiences from the pilot project were used to design a wider scale of intervention to cover other villages in the areas. This was started in early 1980. The main components of the present control programmes are as under:

a. MASS TREATMENT

The medicine used for the treatment is praziquantel with a dose of 30 mg/body weight, twice a day. This is done every six months as a mass treatment for people aged 5 years and older. During the last 8 years, mass treatment has been carried out 13 times.

b. SURVEILLANCE

The surveillance programme is conducted mainly to catch those who miss the mass treatment.

c. ERADICATION OF VECTOR

Oncomelania Hupensis Lindoensis, the snail, is eradicated through various interventions. Bayluscide is used to spray the known focal areas of the snail colonies. In addition, drying the swamp area, cleaning up and burning the bushes are also done in the focal areas. This method of eradication is used every two months.

d. SANITATION

Construction of water supply and latrine is also a component of the programme. Upto 1988, 209 latrines have been constructed.

e. HEALTH EDUCATION

Health education is an important component of the control programme. As revealed from the pilot project, certain components of the programme cannot be sustained without the participation of the community. This is the case with irrigation, drainage and latrine construction. In the control programme, the implementation of health education has been integrated with the other components. In other words, health education is given during mass treatment or surveillance activities.

f. EVALUATION

Evaluation of the control programme is carried out every 6 months.

This covers the examination of human stools, snail and rats. The infection rate among the rats is useful to estimate the magnitude of the infection among wild mammals in the areas.

PROGRAMME COST

Sources of fund for schistosomiasis control, like other health programmes in Indonesia, are those of central government, provincial government and district government. Since its inception in 1981–82, the total budget spent from these sources has reached an amount of Rs 853 millions, or equal to US \$ 500,000. This amount is almost equally shared by the central and regional budgets. The equal sharing may imply that the local government has a strong commitment for the programme, since in many instances of health programme financing, especially those of communicable disease control, the share of regional government is usually less than the share of central government.

As shown below, the total annual budget varies from year to year. On an average the total annual budget is Rp 106 millions or about US \$ 62,000. Since the total population in the area is 7,000 per capita expenditure per year for schistosomiasis programme is about Rp 10,000. This amount accounts for the government share in the expenditure only. The national per capita health expenditure in 1986 was Rp 13,000 inclusive of personal and government expenditures. The government share in the expenditure was only 40% or Rp 5,200.

**Schistosomiasis Programme Cost in Lindu and Napu
(1981-82 — 1988-89)
(in million rupiah)**

<i>Year</i>	<i>Central</i>	<i>Regional</i>	<i>Total</i>
1981-82	74.3	—	74.3
1982-83	76.2	26.3	102.5
1983-83	37.9	34.3	72.2
1984-85	12.9	55.8	68.7
1985-86	106.5	42.7	149.2
1986-87	29.4	25.0	54.4
1987-88	48.6	16.3	64.9
1988-89	31.1	235.7	266.8
Total	416.9	436.1	853.0

Comparison of the Rp 5,200 and the Rp 10,000 figures shows the cost burden the government has to carry in supporting the schistosomiasis control programme. In other words, on a per capita basis, the government has to spend for the schistosomiasis programme in Lindu area an amount about twice of that spent for all other programmes. Or to put it in another way, the comparison shows how expensive the control programme has been.

PROGRAMME PERFORMANCE AND OUTCOME

As shown earlier the control programme has succeeded in bringing down the infection rate to a level much lower than the level before the programme was started in early 1981. The rates in Lindu and Napu before the programme were 17.7% and 23.1% respectively. Only within 1-2 years of the programme implementation, the rates have been reduced to 1.71% in Lindu and 2.69% in Napu.

However, the following years' trend indicates that the low rates have not been stable over time. Occasional increases were observed several times. This implies that the potential for re-infection is still there in the areas. The low rates could be just the result of suppression from mass treatment. The fact that the infection rate in the vector and host

reservoir has not been reduced explains why the rates among the population fluctuate. Infection rate in the snail has remained constant in Napu and reduced slightly in Lindu. In the rats, the rate even increased upto 18.4% from 9.9% in Napu and decreased slightly in Lindu. The infection rate in the rats is an indirect indicator of infection among other wild mammals in the area.

DEVELOPMENT PROGRAMMES AND SCHISTOSOMIASIS, A TRIGGER OR A CURE?

ECONOMIC DEVELOPMENT POLICY

Indonesia has been experiencing a difficult time since the oil price crisis in 1982. GDP growth dropped to -0.33% in 1982 from 7.41% in 1981 (based on 1983 constant prices). The growth during the subsequent years until 1988 remained low, with a rate ranging from 2-4% annually. This rate is obviously far from enough to support the growing demand resulting from population growth of 2% per year. The impact of oil price reduction on Indonesian economy has been severe due to the dominant share of oil in GDP, i.e. 60% during 1978-1985.

The sharp reduction of revenue may lead to a deficit in government spending, which is a threat to the balanced budget policy which the Indonesian government strictly adheres to. This situation leads the government to seek various adjustment measures to maintain the balance of payment. The adjustment measures range from promoting non-oil export, increasing revenue from taxes, various monetary and fiscal policies, promoting growth through loan investment and adjustment in the allocation of government budget among sectors. It is also expected that regional governments increase their share in supporting regional development.

Central Sulawesi, like other provinces in the country, is also affected by the national economic problem. Basically, the province is rich with potential resources, awaiting for exploitation. Although only 47% of the land are arable for agriculture, the province has various other alternative revenues. Surveys have indicated that the province has the capacity of raising about a million heads of cattle a year, especially in the Napu-Benoa and Bada Valleys. A beginning has been made in the Napu Valleys. The preceding sections of this paper have clearly shown that the endemic schistosomiasis is still beyond full control.

The local government and business also recognize the potential of

fishery in the area. It is estimated that about 70,000 tons of fish are ready for catching in the waters bordering the province. Inland water fishery has also large potentials, especially in lake Lindu and Poso.

The province's forest is another big asset. In 1988, about Rp 137 billions (US 480.5 million) has been invested in the forestry sector. Commercial woods such as ebony and high-quality rattan are some commodities yielded from the forest. The rattan and ebony processing industries have absorbed at least 31,000 workers employed in 7,900 units.

One common problem in all of the economic activities mentioned above has been shortage of skilled labour. At present, the total population of the province is 1.6 million, which means only 22 people per square kilometer (compared to 800 people per square kilometer in Java). In this regard, Central Sulawesi is a place considered as having the potential to absorb people from outside the province. In fact, transmigration programme has begun to send people from Java since 1978.

To summarize, various economic development programmes have been intensified in Central Sulawesi, especially since the economic crisis in 1982. Forestry, fishery, cattle, wood and rattan processing and resettlement of population are some prominent activities in the province's economic development. The following discussion addresses several issues on possible interaction between the development activities with the magnitude of schistosomiasis problem.

POPULATION SETTLEMENT

As mentioned earlier in the first section of this case study, small scale local transmigration had taken place in 1959, 1962 and 1967, bringing with a total of 40 families to Lindu Valley. At present, there are 70 families (around 500 individuals) in the village of Owo in Lindu Valley as the result of the local transmigration. In less than one year, 50% of them were infected. In Bamba, another village, local transmigrants were encouraged to farm confirmed transmission areas. They became ill and left the area. Some of them moved to the mountain surrounding lake Lindu and practised slash and burn farming, and this resulted in a series of conflicts with government officials in charge of monitoring forest preservation in the area.

A large scale government transmigration programme started in 1978-79. Record of the number of people resettled in Central

Sulawesi for the period 1978–1984 reveals that the total people resettled was 64,382 or 15,850 families. Of this number, 14,275 (22.2%) were settled in Donggala district, which included Napu and Besoa Valleys. Posso district, which included Lindu Valley, received 16,855 people (26.2%). None of the locations selected for the resettlement belonged to the confirmed transmission areas. However, the growth of population surrounding the endemic areas will, some time in the future, aggravate the transmission, especially if economic activity is intensified in the two endemic areas as a result of various development plans mentioned above.

FISHERY AND CATTLE FARM

Lake Lindu is considered as a potential place for inland water fishery. In fact, the local transmigrants in Owo are mostly engaged in catching fish in the lake. Promotion of or investment in fishery in the lake will attract more people to the endemic area. This has been the case with families in the local transmigration in Owo. The earlier settlers brought their relatives from Kulawi district as their earning in Owo improved.

In Napu Valley, investment on raising cattle has been started. No information is readily available on whether the cattle farms employed local people or brought workers from outside Napu. Regardless of the size of investment made, survey data confirmed the high rate of infection among the local cattle, especially in Napu. The rate was 8.33%, higher than that of 2.00% in Lindu.

LOGGING ROAD CONSTRUCTION

A relatively huge investment in forestry created a need for better roads to allow heavy trucks to carry the logs. In this regard, a logging road has been constructed from Palolo Valley to the village of Bamba. This village is located in the northern shore of Lake Lindu and has been confirmed as an endemic area. As experienced in other places, logging road may be turned into commercial road. If this happens, contact with the outside world will increase.

It is important to note that the strongest reason why schistosomiasis is not spread to other areas is the present isolation of Lindu and Napu Valleys. Now the isolation is diminishing as a result of various development activities taking place in the areas.

DAM CONSTRUCTION

The growth of various sectors in the areas has created a greater need for energy. At an altitude of 950 meters above sea level, the water flowing from lake Lindu through Gumbasa river is a potential source of energy. There is a plan to build a dam at the lake side for a power plant. Construction of this dam will surely create more marshes in which the snails might regenerate. The construction itself will require hundreds or probably thousands of workers. With still a high rate of infection in snails and rodents, one can see that the potential hazards may come along with the construction of the dam.

CONCLUSION

The preceding sections present a case of schistosomiasis in Central Sulawesi, specifically in Lindu and Napu-Besoa Valleys. The case shows what happens in an area where various development activities are taking place in and surrounding that area endemic of a specific disease which still has the potential to spread out. Several conclusions can be derived from the case presented.

THE MAGNITUDE OF THE PROBLEM

The data presented in this paper indicate that schistosomiasis in Central Sulawesi is limited in certain focal areas, i.e. Lindu, Napu and Besoa Valleys. The number of people at risk is around 10,000 individuals.

Intensive control programme carried out since 1981 has reduced substantially the infection rate in the population. This is accomplished mainly through regular mass treatment twice a year. However, the rate has been fluctuating with occasional substantial increase. The fluctuating rate is related to the fact that the programme has not been quite successful in controlling the infection among domestic and wild animals and eradicating the vector snails. Therefore, the potential for reinfection is still there.

The difficulty in controlling the infection in animals and eradicating the snails is related to the geographical condition of the area and behaviour of the population. The surrounding forest in the mountains and the lake side are places where the snails and the host reservoirs live. Most of the places are inaccessible for eradication programme. The habits of the people to defecate in open spaces and cultivate rice only once a year intensify the transmission.

The cost of the eradication programme is quite high. If the potential of reinfection continues to exist, it is likely that the mass treatment will always be needed if the infection rate is to be maintained at a low level. This means that the single schistosomiasis problem will absorb a considerable proportion of resources, especially health resources known to be very limited in Indonesia as well as in the province.

DEVELOPMENT AND TRANSMISSION OF SCHISTOSOMIASIS

Forestry, fishery, cattle farm, plan for a dam construction and population resettlement are potential development projects for the welfare of people in the province. The volume and intensity of activities in these areas are likely to increase in the near future, as a relatively huge amount of money has already been invested in certain areas.

The data used in this case study have not indicated any evidence that the development activities do increase the transmission of schistosomiasis; except one on the limited local transmigration to one village in Lindu Valley. However, it should be emphasized here that the low transmission of the disease has been due to the fact that the endemic areas are quite isolated. There is no doubt that the activities in the development areas mentioned would diminish the isolation rapidly. The most potential areas in diminishing the isolation are forestry, road and dam constructions. The first two are already in progress and the last one is in planning stage.

THE NEED FOR INTEGRATED DEVELOPMENT PLANNING AND IMPLEMENTATION

A dilemma which follows from the preceding sections is: Should all the development projects having the effect of increasing transmission of schistosomiasis be cancelled? Or, should they be postponed until the eradication programme succeeds in reducing the transmission rate to a safe level?

It seems that none of these options are likely to happen. Development activities in various areas will continue to take place in the province, especially in the field of wood and rattan industry which has already become a significant source of revenue.

What is proposed here is to assure that integrated planning and implementation is used as a basis in making decisions in any development project, in which health should be considered an important element. In this regard, the importance of undertaking

Environmental Impact Analysis is obvious. Indonesia has passed a law in 1986 which requires that any development project, whether in the government or private sector, should be preceded with an assessment of its impact on the population and the environment. It may turn out that the impact can be prevented or alleviated at a certain cost. The question then is whether the cost should be included in the total cost of the project.

Some people may argue that including this cost will imply a high cost of production, which may cause that commodity to suffer in the competition in the market. However, we must not overlook that at one point in time, we will be forced to pay the cost of alleviating the negative impact.

In the case of schistosomiasis, an estimate can be made, even though not easily, on the impact, in terms of increased transmission of the disease due to any development project in the province. Further, the cost of controlling the transmission can also be estimated. The answer to the question on who should bear the cost is a policy matter for the decision makers to decide.

For the planning and execution of the Environmental Impact Analysis as required by the law, there have been institutional arrangements regulated nationally. According to the regulation, a Commission for Environmental Impact Analysis is established in each province, headed by the Governor or the Head of the Regional Planning Board of the respective province. The membership of this Commission consists of officers of sectoral office in the province (including provincial health officer), the representative of the community such as from non-governmental organisations, experts from the Environment and Human Resources Development Study Center in the local university, and the Head of the District Regional Planning Board. The regulation for the Commission establishment was issued by the central government in June 1987. The Commission is responsible for ensuring that the Impact Analysis is properly done and its results are taken into consideration for making development policy.

For the eradication programme to be effective, immediate steps should be taken to make the Commission operational and formally include schistosomiasis as an element for consideration in planning development programmes in the areas.

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ADVERSE EFFECTS OF DEVELOPMENT PROGRAMMES ON HEALTH: IRRIGATION PROJECT ON MALARIA

INTRODUCTION

The positive contribution of economic development to improvement in health, as exemplified by the experience of present-day developed countries, is widely acknowledged. Modern economic growth, as it unfolded through the agricultural and industrial revolutions, made a favourable impact on health through increase in food supplies, rise in employment and income, improvement of housing, protected water supply and sanitation, and the general standard of living. Admittedly, the public health revolution and medical revolution themselves, facilitated by modern economic growth, followed later in the day^{1,2}. The potential positive effects of improvement in health on output growth has also been given due recognition. But the negative impact of modern economic growth on health used to be overlooked till recently. Of late, the other side of the coin has begun to receive notice. Several instances of the adverse health effects of development programmes in the Third World countries have been brought out in some recent studies. The adverse effects include the health hazards inherent in industrialization, expansion of transport networks,

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modernisation of agriculture, population movements and in other facets of economic development.

EXPERIENCE OF DEVELOPING COUNTRIES: SECTOR-WISE ANALYSIS

As Basch has observed: "the entire range of industrial occupational hazards can occur even in well regulated plants. Workers in small or marginal industry, more common in the developing world, appear especially susceptible to accidents and disease... Poisoning by toxic substances, including respiratory irritants and heavy metal salts, is widespread especially in foundries and battery manufacturing plants. Inhalation of dusts and fibres, as in cotton and flax, stone cutting or mining industries is a frequent source of respiratory allergy, asthma, chronic bronchitis, and other conditions"³.

The above health hazards have been encountered by even the developed countries in the initial phase of industrialization. Perhaps, their severity may be greater in the developing countries owing to loopholes in the regulation or laxity in their enforcement. As Schaefer has observed, health hazards created by pollution and the widespread use of chemicals are no more the exclusive concerns of industrial countries. On the contrary, we have to recognize that

"developing countries are, in fact, developing a process of industrialization that is bringing with it health hazards common in the industrial world but new to many of the countries now affected"⁴.

The range of these hazards is extremely wide, and would include air pollution caused by automobile exhaust and by-products of manufacturing and mining operations, endangering the quality of water supplied by the dumping of metallic and chemical wastes, improper use of pesticides, etc.

Development of transport network is obviously an essential prerequisite of modern economic growth, as it facilitates movement of food, raw materials, labour and expansion of domestic and international trade. However, the expansion of a network of modern transport also had adverse effects on health in the less developed countries. Sorkin has brought out the negative consequences of the development of road transport in the African Continent. The incidence of sleeping sickness

in the Upper Volta had increased with the north–south migration of labour, facilitated by the improvement in road transport. The greatest incidence of sleeping sickness appeared to have occurred along the major highways:

“Roads thus function as transmission mechanisms and modern highways built to facilitate economic development may in fact constitute a major health hazard in endemic regions. Although their purpose is to encourage movement of people and goods, these facilities encourage the spread of several different kinds of insect-borne diseases”⁵.

Basch has cited the example of the adverse impact of the new road network in Liberia and Nigeria in the extension of sleeping sickness; in Brazil, opening of a new Trans-Amazon Highway has brought workers and new settlers into contact with new disease agents³. The role of South African Railways and Harbours in the diffusion of influenza is brought out by Hogbin. As he has observed:

“rail travel was the dominant mode of long distance transport; it was inevitable that railways played such a large part in the dissemination of influenza... SAR & H records show how in Natal the disease was transmitted along the railways, affecting the important transport modes in turn, and reaching Durban”⁶.

Modernization of agriculture in the LDCs, which involves the adoption of high yielding seed varieties and application of heavy doses of chemical fertilizers and pesticides, is fraught with serious consequences on health: “Pesticides are vitally important in the protection of crops and livestock and in the control of vectors of human diseases; yet, in many countries they constitute a danger to people”⁷. The risk of poisoning from fertilizers, herbicides, and pesticides had become significant in many areas, as brought out by several studies. As has been observed:

“apart from the handling of machinery, the most important risk of agricultural work is derived from the use of pesticides. These substances, as is well known, are dangerous because of their immediate toxic effects, but also since some of them are suspected carcinogens. Moreover, the risks related to pesticides are greater in the under-developed countries, since some of these

substances banned in other countries are freely used, without even minimum precautions. In Ceylon, it was found that 30 per cent of the accidental poisoning was provoked by agricultural chemicals, and that the greatest majority of the victims were between 15 and 50 year age”⁸.

According to a recent study, there has been a resurgence of malaria in Central America and India. For instance, the malaria eradication programme brought down the incidence of the disease from over 100 million in 1952 to 50,000 cases by 1961. But by 1970, the programme ran into difficulties and 5 million people soon caught the disease. The explanation for this phenomenon is that:

“as infection rate dropped during the attack phase, hard-pressed governments often diverted critical resources from antimalaria activities to other essential projects. Even more ominously, resistance to DDT and diadrin had reached alarming proportions among *Anopheles* mosquitoes — just as WHO officials had originally feared. In India widespread tolerance to organochlorines was discovered among two important vectors *Al Culicifacies* and *Al Fluviatilis*, particularly in regions which had recently shifted to high yielding forms of agricultural production. In such places, effective control might be regained only by using insecticides which cost 4, 5 or even 10 times as much as common toxins..... Vectors which became resistant to one compound frequently enjoyed mysterious immunities to entirely unrelated poisons, and, in any case, it was only a matter of time before natural selection favoured those insects which could withstand a broad spectrum of chemical agents”⁸.

Ironically, commercial agriculture — in which chemical pesticides were also used — often expanded in precisely those areas which had been recently cleared of malaria. In the process, inequality in land ownership and rural poverty had increased, and the death rate from infectious and parasitic diseases in Central America remained extremely high. The response of the farmers in Central America was to apply more pesticides:

“In order to combat these plagues and to raise their

yields, planters in Guatemala, Nicaragua and El Salvador have not only expanded their acreage, but since 1970 they have also applied heavier concentrations of poison. Whereas a decade ago such fields were sprayed only 8 or 9 times each season, at present they must be fumigated on as many as 90 occasions. Consequently, the amount of poison which enters the local ecosystem has expanded at a burgeoning rate”⁸.

An obsession with the need for total control of insect parasites has led to their reliance on expensive chemicals, thereby creating the conditions for a revival of *Anopheles Albimanus*, the local malaria vector. The resurgence of malaria in India, particularly in Tamil Nadu, is associated with the onset of the green revolution. The new strains of rice cultivated by many Indian farmers appeared to be especially susceptible to insect infestation:

“Farmers have responded to this problem by applying heavy doses of DDT, BHC, and diadrin — a procedure which may well be related to the recent explosion of malaria in the region. Moreover, as these growers have switched from DDT to more sophisticated chemicals, traditional disease vectors have been replaced by rarer species which show diminished sensitivity to such poisons”⁸.

Of late there has been an increasing concern over the impact of man-made lakes and irrigation schemes on the health status of populations in adjoining areas. Ordingo recalls the report of the Nobel Workshop on Schistosomiasis held in Stockholm in 1973:

“Water resources development schemes have been installed in large numbers especially in developing countries because of their obvious economic and social benefits and contribution to development. While many of the consequences, such as agricultural and economic, are positive and anticipated, many are not considered, and major consequences are negative. There is evidence that health is undermined by the projects due to the spread of water-borne diseases. Of these schistosomiasis is unquestionably a major factor”⁹.

Ordingo proceeds to observe:

“Apart from schistosomiasis, the construction of dams on

rivers may lead to an explosive increase of malarial mosquitoes, and in some cases like Volta Dam in Ghana, to the increase of river blindness, fly *Simulium Damsnosum* and the consequent risk of Onchocerciasis. Another common disease associated with water development projects in developing countries is sleeping sickness disseminated by tsetse flies....⁹

As early as 1954, the Department of Health, Rhodesia warned that large scale irrigation projects might prove harmful to the health of the population and bring the largest of these projects to an end. In fact, one of the first irrigation schemes established in that country was abandoned because the project facilitated the spread of malaria and schistosomiasis⁵. Hunter, Rey and Scott have dwelt at length on the health hazards of man-made lakes in their two recent articles. They have observed that in the tropical countries of Africa, Asia and Latin America, the construction of dams is being accelerated and growth trends generally are following an exponential curve. Water impoundment schemes for irrigation and other purposes in areas of endemic water-related diseases, have intensified community levels of infection and also created new areas of transmission:

“What emerges from the information available is that a general acceleration of disease transmission has occurred in the wake of water impoundments and irrigation schemes in Africa, Asia, and Latin America. Old foci of infection have been greatly enlarged and exacerbated and new diseases sometimes introduced. Indeed, patterns of disease intensification that have emerged reflect man’s efforts to change the environment purposes”¹⁰.

In fact, they make a more sweeping and stronger assertion when they say:

“Indeed, there are very few newly introduced economic activities that are entirely free of adverse repercussions on health. Thus, ironically, economic activity under the banner of ‘development’ is creating ill-health which is a strange form of societal self-abuse. Water management schemes are particularly implicated because they set off a series of ecosystem disturbance that involve parasite and infectious disease transmission cycles”¹⁰.

Another significant observation they make is that water impound-

ment schemes involving irrigation and power production results in regional asymmetries of benefit and risks:

“People living in towns and participants in the wider national economy enjoy electricity, wage employment and other economic benefits generated through the water development schemes, whereas people at the lake side suffer from increased disease and are worse off than before. Through this inequality of distribution of benefits, the effect of water management scheme is to exaggerate social and economic disequilibrium in different parts of the country”¹⁰.

The authors sum up the net effect of all water impoundment schemes thus: “man/water contact, vector populations and disease incidence will predictably rise faster than would ever have been envisaged. This will truly result in a “shock” situation. It may well be depressing, but probably not unrealistic to say that developing countries have just reached the foothills of this problem and that the mountains lie ahead”¹⁰. The rapid proliferation of mosquitoes that transmitted malaria or dengue haemorrhagic fever, of certain snails and fish that spread liver-fluke infection, schistosomiasis, etc., in the wake of construction of several dams by the government in Thailand in the 1960s provide another example. The foregoing review of the adverse health effects of water resources development projects should be taken with due caution, as pointed out in a recent paper:

“Most studies evaluating the effect of environmental change on schistosomiasis do so retrospectively, using limited epidemiological data, often without baseline data or controlled longitudinal measurements. This unfortunate situation is due primarily to failure to carry out ecological and health surveys in project areas prior to the planning and construction phase”¹¹.

What are the economic implications of the adverse effects of development on health? What is the magnitude of economic and financial losses engendered by the worsening morbidity situation? In a seminal work, Sinton has unravelled the various dimensions of the cost of malaria. Based on an extensive survey of past studies, he has brought out the enormous cost caused by this disease to British India in the thirties. His analysis covers the effects of malaria on the death rate including direct mortality and morbidity caused indirectly by the

disease, the adverse effects of malaria upon the physical development of the population, upon social, intellectual and political progress of the nation¹². The financial and economic losses partly comprise costs of medical care by way of hospital charges, nursing, doctor's fees, medicines, etc. As Sinton has observed:

“no reliable figures are available of the sums which are spent annually by private individuals on medical attendance, on drugs, on nursing, and the lost wages of family members who act as sick attendants, on extra food, etc”¹².

However, he has cited a few attempts in the past on estimating private direct costs of the disease. For example, Col. W.G. King (an unpublished memorandum of 1911) estimated that

“during an illness lasting 14 days, the cost of extra necessities and food, medical attendance, medicine, etc. in the case of an adult of the lowest labouring class in India was Rs. 2 and of a child Rs. 1.50. If one takes the figure of 100 million cases of malaria in British India annually, and a cost of Rs. 1.50 per case, this means the losses of the family and the individual amount to Rs.1,500 lakhs per annum... The figures used by Col. King were estimated nearly a quarter of a century ago, and since then these costs must have risen very considerably¹².”

Assuming 3 days' loss of time on an average to a wage-earning adult, for nursing an attack of malaria in another member of the family, and an average wage of Rs. 5 or its equivalent earned per month, Sinton arrived at the financial loss of Rs. 500 lakhs. *“These figures appear to indicate that on the lowest possible estimates, the cost of the individual and the family for medical attendance, etc. is at least Rs. 2,000 lakhs or about 15 million sterling per annum”*¹² (emphasis as in the original). Malarial sickness also entails other forms of cost such as sickness leave and the loss of wages while sick. These costs are also borne by the individual and the family.

Sinton has observed further that “the infection also results in diminished capacity, both mental and physical (of the worker) for performing his duties when he is able to return to them. His efficiency is lowered, his output is smaller and its quality poorer than that of a healthy person”¹². These have significant implications for the

employer in terms of higher cost, thanks to diminished labour output, impaired efficiency and greater turnover of labour. Sinton proceeds to estimate the value of days of work lost directly due to malarial sickness. Assuming that 33 million adults, i.e. one-third of the infected population, suffered from malaria each year, that they lost on an average half a month's working days per annum, and the value of a month's work is Rs. 7.1/2, the total loss would come to Rs.1,240 lakhs¹². Loss of efficiency among malaria-infected persons is estimated at 25 percent, and on this basis the financial loss due to post-malaria inefficiency is estimated to be equivalent to about Rs.2,790 lakhs¹².

Apart from the above attempts at quantifying the cost of malaria infection to individuals and families, Sinton also examines the financial and economic losses caused by malaria to agricultural development, industry, mining, transport and communication, loss of revenue and additional cost of administration incurred by the government due to malaria infection.

In the nature of things, the estimates could only be rough approximation, and Sinton has presented them with due caution. However, this pioneering study has brought out the numerous components of the cost of malaria to the infected, their families, the real cost in terms of the adverse impact of the disease on economic development in general. We have not come across any similar exercise covering any recent period.

The adverse health effects of development programmes in the Third World countries have been brought out in some recent studies. These include the health hazards inherent in industrialisation, expansion of transport networks, modernisation of agriculture, etc. Industrialisation increases health hazards caused by inhalation of dusts and fibres, pollution, widespread use of chemicals, etc. Development of transport network has accentuated the incidence of sleeping sickness, diffusion of influenza, as exemplified by the experience of several countries in Africa. Modernization of agriculture, involving the use of high doses of pesticides has invited accidental poisoning and resurgence of malaria, thanks to the mosquitoes developing resistance. The expansion of irrigation facilities, through development of water impoundment schemes has intensified the incidence and diffusion of water-borne diseases like schistosomiasis and also malaria. The cost of the worsening health status in terms of medical care expenses, work days lost, earnings foregone and the adverse

impact on development of human and material resources should be formidable.

HEALTH OUTCOMES OF DEVELOPMENT POLICIES AND PROGRAMMES

We have presented above an overview of the adverse effects of economic development policies on health of the population, an aspect overlooked till recently. In this section we will attempt to examine the health outcomes of the development policies and programmes pursued by the government in post-Independence India. We shall confine our attention to the impact of the programmes implemented in the field of agriculture, as agriculture is the mainstay of the majority of the population, and the programmes of this sector have a greater bearing on the health of the rural population. Development of irrigation facilities received high priority in the agricultural programmes under the five year plans. As we have noted earlier, irrigation projects have been associated with the spread of some infectious diseases like schistosomiasis and malaria. The focus of our study will be on the incidence of malaria vis-a-vis water resources development and other agricultural programmes. The magnitude of the problem, the numbers and groups affected, its cost, alternative strategies in combating the problem, are some of the aspects which we will attempt to analyse. Given the limitations of available data, only a rudimentary analysis is attempted here.

AGRICULTURAL PROGRAMMES IN INDIA'S FIVE YEAR PLANS

The critical role of agriculture in the development of the national economy is reiterated in the successive five year plans:

“Development of agriculture, based on the utilisation of manpower resources of the countryside and the maximum use of local resources, holds the key to the rapid development of the country.”

As mentioned above, a high priority was accorded to the expansion of irrigation facilities.

IRRIGATION

In 1951, at the commencement of economic planning in India, the total area irrigated in the country from all sources was about 51 million acres. During the First Five Year Plan (1951–56) addition to



irrigated area was envisaged to be 16.3 million acres, of which large and medium irrigation projects accounted for 6.3 million acres. In the Second Five Year Plan (1956–61) it was proposed to bring under irrigation an additional 21 million acres, of which 12 million acres were to benefit from large and medium projects. During the Third Plan, additional irrigation potential of about 13.9 million acres was expected to be created. (Third Five Year Plan *op.cit.*, pp.383). The possibilities opened up by the new high yielding varieties of seeds from the mid-sixties, and assured supply of water being a prerequisite to draw out fully the genetic potentialities of the new seed varieties, heightened the importance of irrigation, as reflected in the plan outlay on irrigation in succeeding five year plans.

Thus, the provision for irrigation increased from Rs. 661 crores, 28.1 per cent of the total plan outlay of Rs. 2,356 crores in the First Five Year Plan, to Rs. 717 crores or 19 per cent of the total of Rs. 4,800 crores in the Second Five Year Plan. (Second Five Year Plan *op.cit.*, Table pp.51–52). Provision for major and medium schemes in the Fourth Plan, including continuing schemes from the Third Plan came to about Rs. 954 crores and that for minor irrigation Rs. 515 crores (Fourth Five Year Plan, Tables 6 & 7, pp.252–253). Upto the end of the Fourth Plan, 1973–74, total expenditure on major and medium schemes added upto Rs. 2,157 crores. Total provision in the Fifth Plan, including outlays on spillover or continuing schemes of these two categories, was placed at Rs. 2,401 crores (Draft Fifth Five Year Plan, 1974–79 Vol. II, Tables 2 & 3, pp.109). Total investment on major and medium irrigation projects during the period 1951–88 comes to Rs. 21,450 crores. In brief, the estimated irrigation potential stood at 9.71 million hectares at the commencement of the planning era. By the end of the Fifth Five Year Plan, 1978–79, an additional area of 17.94 million hectares was estimated to benefit from major and medium irrigation schemes included in the successive plans. In addition, a little over 31 million hectares would be getting the benefits from minor irrigation schemes. Though the proportion of irrigated land to total cropped area or the estimated aggregate potential developed so far are comparatively low, the expansion in the coverage during the first three decades of planning is quite significant.

As Ramalingaswamy has noted:

“Events in India provide a striking illustration of the intertwining of development and health and makes all too clear how success in one domain can entail severe

setbacks in the other¹³.”

According to him, development activities have compounded the difficulties. He has cited the adverse effects of water resources development and use of chemical insecticides in support of his argument:

“Provision of water to rural areas for agriculture and human use is an essential part of development; but if the construction of dams, the digging of irrigation canals... are not accompanied by a water management system that takes potential breeding places of disease vectors into account, the benefits of the material progress may be outweighed by adverse health consequences. Man-made malaria is all too real. Examples abound: areas of India that were subject to malaria epidemics only in years of heavy rainfall have, because of development projects, become endemic for the disease¹³.”

Plant protection measures

Besides irrigation, plant protection measures constitute a major input of the new agricultural technology:

“In the new agricultural technology, plant protection has acquired an added significance. This is due to both technical and financial reasons. In the case of high-yielding varieties, conditions which are conducive to the growth of plant population are also favourable for weeds, pests and diseases. Moreover, the high-yielding varieties necessarily entail a high cost of cultivation and hence a cultivator can ill-afford to lose his crop. If full benefit is to be derived from the costly inputs, plant protection measures in various forms such as seed treatment, weed control and post-sowing prophylactic treatment must be made an integral part of cultural practices.” (Fourth Five Year Plan, *op.cit.* pp.133).

The production of pesticides was stepped up from 6,400 metric tonnes in 1960–61 to 40,000 tonnes by 1968–69. In the Fifth Plan period a significant step-up in plant protection programmes was envisaged. The level of pesticide consumption, which came to 4,500 tonnes on the eve of the Fifth Plan, was sought to be raised to 74,000 tonnes of annual consumption. As Ramalingaswamy had warned:

“diseases transmitted by insect or vectors — malaria, filariasis, and Japanese encephalitis, for example — are diseases that we tend to take for granted as part of the daily lives of much of our population, despite the adverse effect they have on health and well-being. We are at the crossroads today in our ability to control these diseases. We have relied on chemical insecticides as a major method of vector control; but growing problems of vector resistance to the insecticides, their rising costs, and major concerns regarding their environmental impact have introduced an element of uncertainty and technological despair¹³.”

Magnitude of the Problem

The occurrence of malaria passed through several phases of rise and fall. According to one estimate, the annual incidence of the disease in India dropped from 75 million cases in 1952–53 to about 10 million cases in 1960–61, such a marked decline being attributed to the antimalarial measures undertaken during the First and Second Five Year Plans. (Third Five Year Plan, *op.cit.*, p.659)). According to an alternative source, the total number of positive cases in 1961 was only 49,151¹⁴. However, it is significant to note that over the next one decade and half, the number of positive cases registered a steep and steady rise, as summarised in the table below:

Positive Cases of Malaria in India, 1961–81

<i>Period</i>	<i>No. of positive cases</i>	<i>Population '000s</i>	<i>Incidence rate per cent</i>
1961–63	65,344	4,45,943	0.015
1965–67	1,75,328	4,84,641	0.036
1971–73	15,60,440	5,56,103	0.281
1975–77	54,58,086	6,09,107	0.896

Source: Health Statistics of India, Annual Series.

Evidently, the increase in the incidence of malaria during 1961–77 had been exponential. The number of positive cases during this period

increased by nearly a hundred fold. The incidence rate went up from 0.015 per cent to 0.896 or about sixty fold.

The total incidence of malaria reached its peak in 1976. Since then it registered a significant and steady fall touching a low of 1.91 million by 1983. From the above it may be hazardous to presume that the decline trend will continue, as the total number of malaria cases registered a moderate increase in 1984. Moreover, the number of *Falciparum* cases kept on increasing during 1978-84¹⁵. However, the incidence rate as of 1983, viz, 0.40 per cent was significantly higher than in the early 'seventies, not to speak of the early 'sixties.

An inter-state comparison of the incidence of malaria brings out some interesting facts (See Table overleaf). Three States, viz. Haryana, Gujarat and Punjab, in that order, had incidence rates significantly higher than that in the other States for the entire period 1974-83. In almost all the States, the incidence rate registered a steady increase from 1971 till 1976; however, the rate of increase was perceptibly higher in these three States than elsewhere in the country. Since the mid-seventies the incidence rate started falling in all the States, but the rate of decline had been lower in the three leading States. While the rate of incidence in Haryana and Punjab in the terminal year was higher than in the initial period (1971), the position was just the opposite in the case of Gujarat.

Incidence Rate of Malaria, State-wise, 1971-83: Percent

	1971	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Andhra Pradesh	0.05	0.29	0.32	0.45	0.20	0.15	0.11	0.06	0.07	0.06	0.07
Assam	0.12	0.36	0.75	0.86	0.50	0.44	0.40	0.23	0.29	0.30	0.24
Bihar	0.02	0.14	0.16	0.15	0.13	0.07	0.11	0.05	0.09	0.07	0.06
Gujarat	2.11	2.00	2.72	4.04	2.32	1.27	1.64	1.09	1.21	0.96	0.79
Haryana	0.24	2.15	4.64	6.60	5.45	6.10	3.72	2.26	2.37	1.40	1.01
Himachal Pradesh	neg	0.23	0.46	0.61	1.14	1.34	1.06	1.26	1.99	1.11	0.87
Jammu & Kashmir	neg	0.07	0.33	0.74	0.73	0.52	0.22	0.10	0.12	0.16	
Karnataka	0.13	0.56	1.05	1.97	1.42	0.95	0.82	0.55	0.42	0.27	0.16
Kerala	neg	0.56	0.11	0.02	0.02	0.03	0.02	0.01	0.02	0.02	0.01
Madhya Pradesh	0.46	1.07	1.83	1.88	0.65	0.54	0.54	0.35	0.62	0.43	0.28
Maharashtra	0.40	0.80	1.29	1.25	0.57	0.37	0.35	0.31	0.18	0.13	0.13
Orissa 0.15	1.78	1.34	1.36	0.57	1.49	1.21	0.88	1.12	1.10	0.85	
Punjab	0.38	1.61	1.98	2.96	3.36	3.03	2.07	1.24	1.38	1.21	0.99
Rajasthan	0.43	0.64	1.26	1.43	1.25	0.52	0.27	0.30	0.29	0.21	0.32
Tamil Nadu	neg	0.05	0.17	0.23	0.18	0.16	0.20	1.55	0.16	0.15	0.13
Uttar Pradesh	0.31	0.21	0.41	0.35	0.44	0.37	0.15	1.55	0.16	0.15	0.73
West Bengal	neg	0.04	0.08	0.06	0.03	0.32	0.02	0.02	0.05	0.06	0.66

Source: Estimated from the data on Positive Case of Malaria as published in the Health Statistics of India, op.cit.

Though Gujarat, Haryana and Punjab look similar in malaria incidence rates, the factors underlying the occurrence of the disease in the three States may be different. Haryana and Punjab have made great leaps in agricultural development while Gujarat is agriculturally backward but comparatively developed in the field of industry. As is widely recognised, Haryana and Punjab have been in the forefront of the green revolution, thanks to better irrigation facilities, higher cropping intensity, adoption of high yielding varieties of seeds, greater application of plant nutrients and pesticides, as shown in the table below.

Indices of Agricultural Development

<i>Item</i>	<i>Punjab</i>	<i>Haryana</i>	<i>Gujarat</i>
Percentage of irrigated area (1978–79)	78.09	52.55	17.97
Intensity of irrigation	169.0	155.0	113.0
Intensity of cropping	159.0	151.0	109.0
Input of plant nutrients	92.90	37.60	30.90

Source: [29] [30]

As against 78 per cent, and 53 per cent of the net cropped area irrigated in Punjab and Haryana, the corresponding proportion comes to hardly 18 per cent in Gujarat. However, a major irrigation project, the Narmada–Sarovar Project is being initiated in Gujarat. This project still in a formative state is yet to make its impact on malaria incidence in the region (See Exhibit 1).

Recent developments in agriculture in the developing countries which involve expansion of irrigation facilities, intensification of cropping, greater application of pesticides, etc., had admittedly negative impact on health:

“Those agricultural developments attract large numbers of temporary workers. The traditional poor malarial village is being replaced increasingly by a mobile rural population searching for work. The workers are concentrated temporarily in labour camps where inappropriate siting and shelters, lack of care of the

immediate environment and overcrowding create optimal condition for malaria transmission."

It is well documented that cultivation operations in Haryana and Punjab lean heavily on migrant labour from neighbouring states.

As noted above, the State of Gujarat has a comparatively developed industrial sector. Judged in terms of indices like per capita value added in manufacturing, share of manufacturing in the state domestic product, etc. Gujarat holds the second highest rank among all the States as seen below:

Indices of Industrial Development

<i>Item</i>	<i>Gujarat</i>		<i>Maharashtra</i>		<i>All India</i>
	<i>Rs.</i>	<i>Rank</i>	<i>Rs.</i>	<i>Rank</i>	
Per capita value added in manufacturing (1977-78)	342.5	2	405.5	1	183.4
Ranking in terms of percentage of NDP in manufacturing (1978)		2		1	

Source: [29]

Industrial development in Gujarat, as elsewhere, has stimulated rural-urban migration, emergence of slums, overcrowding, poor housing, water supply, and sanitation, and in general poor living conditions. Such conditions are conducive to the multiplication of malaria vectors, and transmission of the disease, especially in the urban areas. As against this, the rural areas of the State have had high endemicity of malaria. The situation was exacerbated by the weakening of the malaria eradication programme, or increasing resistance of mosquitoes to insecticides. The National Malaria Eradication Programme was started in the State in 1950:

"Owing to the resistance to the previously effective insecticides like DDT and BHC, malaria has reappeared in the State as is seen from the fact that 8.11 lakh cases were identified between 1st January 1976 and 30th October 1976"¹⁶.

It is also significant to note that while the Third Five Year Plan (1961–66) of Gujarat included a provision of Rs. 188 lakhs, and the Fourth Five Year Plan (1966–71), Rs. 200 lakhs for malaria eradication, strangely enough, the Control of Communicable Diseases Programme in the subsequent years is confined to tuberculosis, filaria and leprosy (Government of Gujarat, Development Programme in Gujarat State, annual series for the period since 1971–72). The above finding conforms to the trends in other parts of the Third World as vouchsafed by the WHO Expert Committee on Malaria:

“The impossibility of meeting the high costs of the malaria surveillance (needed for the consolidation or maintenance phases) in the face of other very severe health problems competing for resources was perhaps the main reason why the eradication strategy failed in the majority of developing countries¹⁷.”

WHO SUFFERS?

Apparently, the malaria vectors or mosquitoes do not discriminate between age, sex or socio-economic groups. However, the risk of infection varies among different groups. The main risk factors identified are exposure, migration, environment, nutrition and general health status. Risk of exposure is increased by poor quality of housing and proximity of human and animal shelters. Transmission may be increased by overcrowding and insanitary conditions. Environmental changes, as reflected in water and soil conditions, contribute to increasing the vector population and heightening malaria transmission. Nutritional deficiency and low health status also help to increase susceptibility to, and severity of, malaria. The adverse effects of the risk factors are apt to be more severe on the households belonging to the lower socio-economic strata. The negative impact of development programmes in such sectors as water resources and agriculture, manifested in increased vector breeding and transmission of malaria, may also be felt more by the disadvantaged groups like migrant labour or evictees accommodated in poorly planned resettlements¹⁷.

Incidence and prevalence rate of malaria among different age and sex groups and socio-economic classes are essential information for the formulation and implementation of appropriate policies. Unfortunately, data on the differential incidence and prevalence

rates of the disease in India are not available. Nevertheless one would venture to hypothesize that, *a priori*, the population groups who are most vulnerable in terms of the above risk factors are those who are in the bottom rung of the society.

IMPACT OF MALARIA ON THE COST OF HEALTH AND OTHER SECTORS

A quantitative assessment of the impact of malaria, in terms of the cost of treatment to the individual afflicted and their families as well as to the economy in general, is a formidable task. As brought out by Sinton, referred to earlier, the dimensions and variables involved are so numerous as to make the task of data collection extremely difficult. It may be recalled that the costs of malaria include private, direct costs or expenditures on medical care by way of hospital and nursing charges, doctor's fees, medicines, extra food, etc., and indirect costs by way of earnings foregone by the sick and by family members attending the sick. The costs also include public expenditure on the provision of preventive and curative remedies. The negative impact of malaria on the physical and intellectual development of the population, and on the concerned sectors of the economy are the other dimensions of the loss involved. Of these categories of costs, no data are readily available either on the disease-specific private expenditure, or on the number of work days and earnings lost by the sick and the attendants. Nor has any in-depth analysis on the adverse effects of malaria infection on productivity and efficiency of labour, labour turnover, and development of particular sectors or regions been attempted in recent years. The only readily available data on the cost of malaria for recent periods is that of public expenditure on the control of the disease.

Thus, the total provision for the control of malaria in the First and Second Five Year Plans amounted to Rs. 15 crores and Rs. 27.90 crores respectively, accounting for around 10 per cent of the total outlay in the health sector¹⁴. The revised outlay on the National Malaria Eradication Programme in the Fourth Five Year Plan came to Rs. 93.13 crores, and the proposed outlay during the Fifth Plan period Rs. 96.71 crores. Obviously, expenditure incurred by the government for malaria eradication and treatment of the sick is only the tip of the iceberg. Private expenditure on hospital charges, doctors' consultation fees, medicines, extra food, etc., should be substantially more. The earnings lost by the infected when sick and by

the family members attending the sick are equally important. No estimates for the above parameters, not to speak of the deleterious effects on productivity, for recent periods are available. Collection and analysis of primary data covering the various parameters involved constitute an important task on the agenda for the immediate future.

To sum up, a high priority was accorded to irrigation in the agricultural programmes in India's Five Year Plans, as reflected in the substantial outlay. The total investment on major and medium irrigation projects during 1951–1988 come to Rs. 21,450 crores, resulting in a significant increase in area irrigated. In the wake of the introduction of new seed varieties, the use of fertilizers and insecticides has increased many fold. With the mosquitoes developing resistance to insecticides, incidence of malaria, which had registered a decline earlier, made a phenomenal resurgence. The incidence rate is seen to be higher in Punjab and Haryana, the States with the highest intensity of irrigation and in the forefront of the green revolution. The population groups who are most vulnerable to the risk of infection are presumably the members belonging to the poorer households. The cost of high mortality and morbidity to the individuals and families affected by the disease and in terms of the adverse effects on overall development should be enormous.

CONCLUSIONS AND POLICY OPTIONS

(i) What lessons can be learned from the experience reviewed above? The recent periods witnessed a resurgence of malaria in the Third World countries like India. The studies that went into the reasons for this rising tide, identified factors like increasing resistance of mosquitoes and parasites to chemicals and drugs, inadequate research and training, insufficient supply of chemicals and drugs, etc¹⁸. Of the above factors, the first, viz., increasing drug-resistance of mosquitoes is the most disturbing. In a recent study, Alan Schapira (1989) has brought out the growing resistance of malaria to chloroquine¹⁹. Starting with Colombia and Thailand around 1960, chloroquine resistance, falciparum infection, spread in malarious areas in South America, Asia and Oceania, and since the mid-seventies in Africa:

“Resistance has spread into areas where the use of chloroquine has been limited and presumably suboptimal. Nonetheless, it seems that a heavy consumption

of the drug for treatment or prophylaxis may lead to a particularly rapid build-up of chloroquine resistance in the parasite population¹⁹."

We had noted earlier the steady increase in *P. Falciparum* cases of malaria in India since the mid-seventies. As the WHO Expert Committee has noted:

"Resistance of *P. Falciparum* to most of the current antimalarial drugs has emerged as the main technical problem in malaria control¹⁷."

Resistance of vectors to insecticides is another phenomenon brought out in the above report:

"At present, at least 57 species of *Anopheles* have been reported to be resistant to one insecticide or more in some parts of their geographical distribution¹⁷."

From the foregoing it would appear as though the malaria control programme based primarily on drugs and insecticides, is no more effective in eradicating the incidence of the disease.

(ii) If the above conclusion is valid, what then are the appropriate policies required to avoid repetition of the past experience? An obvious proposition is the old adage that prevention is better than cure. The policies should be directed to strike at the root of the problem. The genesis of the problem, as we had noted earlier, lies in certain physical and socio-economic conditions which are conducive to the multiplication of the vectors and intensifying the transmission of the parasites — pools of stagnant water, lack of drainage, overcrowding, poor housing, lack of protected water and sanitation etc., the general health status, as conditioned by levels of income, education, etc., also has a bearing on the susceptibility to infection. Under these conditions, a synergistic approach, as embodied in the Alma Ata Declaration, embracing all the factors affecting health, is called for. The International Conference at Alma Ata in 1978, while reiterating the goal of Health for All, formulated the primary health care approach seeking to provide promotive, preventive, curative and rehabilitative services, and involving all health-related sectors such as agriculture, animal husbandry, food, industry, education, housing, water supply, sanitation, etc. Coming to specific policies, the first item in the agenda should be malaria vector control. Vector control is an integral part of the prevention of malaria. However, as the WHO Expert Committee has pointed out, it has been organised at the central and regional

levels and based on a vertical administrative approach. The Committee has suggested an integrated approach and community involvement. The feasibility of vector control by such simple measures of biological control as source reduction, rearing and release of larvivorous fish, and prawn and crab, through health education and community awareness and involvement, as exemplified by the initiative of villagers, has been reported by the Expert Committee¹⁷. Policies in this area should also incorporate strategies of environmental methods. As Ramalingaswamy has pointed out:

“Simple methods of filling, levelling, or drainage, minor engineering to prevent stagnant pools of water, essential antilarval measures, improvement of channels and seepage drains by cement lining; and intermittent irrigation and elimination of waste of irrigation water are some of the known techniques of vector control practised in the past that need to be reviewed¹³.”

Appropriate policies covering the health-related non-health sectors such as food, housing, water supply, sanitation, etc. should be formulated. Needless to say, the policies should be based on an objective assessment of the felt needs of each region and cost-effectiveness of the programmes involved.

(iii) If one might repeat an aphorism, formulation of policies is one thing, but their implementation is another matter; however progressive and radical the policy, without appropriate institutional changes, the reforms will remain on the statute books. What are the institutional mechanisms necessary to ensure that the policies are carried out? Admittedly, at present the malaria control programme is **centralised** and vertically administered. The programme could be rendered more effective if the primary health care mechanism, with more active participation by the community, is entrusted with the tasks, as the Expert Committee recommends:

“Wherever malaria is a serious public health problem, the training of community workers in the diagnosis and treatment of malaria, and their continued support by the health services in terms of supplies and acceptance of referred problem cases, may be the first step in the development of primary health care¹⁷.”

Decentralization of power as well as devolution of financial resources — not only in the hierarchy of medical establishment but also in the

general administrative set-up — are also called for.

(iv) As we had noted earlier, the negative impact on health of development programmes like irrigation projects will be borne by the disadvantaged groups like agricultural labour and other poor households. Therefore, in order to safeguard the health of such vulnerable groups, special programmes aimed at providing better housing, water supply, sanitation, health education should be designed and implemented. These measures will be more cost-effective than curative programmes.

(v) True, development programmes like irrigation and hydro-electric projects have accentuated the incidence and spread of malaria in several parts of the world. However, this is not an unavoidable malady. Even in this country, we have examples of states like Kerala and Tamilnadu where, despite implementation of such programmes, malaria stands almost banished²⁰. The experience of states like Kerala, therefore, may provide some insights for the formulation of appropriate policies.

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EXHIBIT 1

Narmada Dam

The Narmada Dam has a long history. As far back as 1946, Sardar Patel had mooted the idea of harnessing the Narmada waters. Preliminary investigations were initiated in 1947. The foundation stone of the Narmada Project was laid by the late Prime Minister Jawaharlal Nehru in 1961. Since the project involved more than one State (Gujarat, Madhya Pradesh, Maharashtra and Rajasthan), the Government of India appointed the Narmada Water Disputes Tribunal in 1969; the Tribunal gave its award in 1979. Construction activities were initiated by the State Government of Gujarat in 1979 with the excavation of foundation. A portion of the main concrete dam on the left bank was completed, construction of the main canal had commenced. However, it took another eight years for the Government of India to give the environmental clearance for the project. The investment clearance from the Planning Commission was received only in October, 1988.

In the meantime, the Narmada Sarovar, alias Sardar Sarovar Project generated a great deal of heat and public reaction. Damage to environment, financial implications of underestimation of costs and ill-conceived schemes for fund mobilisation, time overruns and delays in completion, deficiencies in catchment area treatment, compensatory afforestation, and problems of rehabilitation and resettlement are some of the issues raised by the critics of his controversial projects²¹. The promises underlying the criticism have been questioned by several eminent scholars and publicmen. Mehta has argued that for Gujarat with low and erratic rainfall, shortage of electric power, Narmada project is the "only option and hope"^{22(a)}. In another response to Baba Amte, Mehta has attempted to show that the cost estimates are valid and that resource mobilisation for funding the project is within the State's proven ability^{22(b)}. In response to the concern for the environmental degradation and inadequacies in catchment area treatment, it is pointed out: "Minimising adverse impacts on the ecosystem due to implementation of SSP has been one of the foremost objectives in the project planning process and hence at the early stages of project formulation a systematic, scientific impact assessment study was undertaken with the assistance of academicians. The outcome has been very helpful to plan environmental conservation measures for the entire project areas²³." As for catchment area treatment, it is claimed that a concrete time-bound

work plan for soil conservation and afforestation has been prepared, keeping in view the recommendations of the Dewan Committee²⁴. Be that as it may, the controversy around the Narmada dam has virtually stalled its take-off.

The Narmada Water Resources Development Committee in its Report had given a warning: "The construction of the terminal and other storage dams would involve submersion of lands of which between 40 to 50 per cent may be cultivable and, therefore, pose a major human problem²⁵." The submersion and water logging would also be conducive to breeding mosquitoes and spread of malaria.

Some studies have been conducted to establish a health profile and assess the likely impact of the project on public health. Common diseases encountered included malaria, scabbies, dysentery, diarrhoea, cholera, tuberculosis, jaundice, influenza and goitre. Of these, malaria was the most prominent²⁴. A special investigation was carried out by an expert team of scientists and doctors of the WHO, World Bank and the NICD regarding the likelihood of the spread of schistosomiasis in the project area. The expert team ruled out the likelihood of this disease spreading in the project area. In another study commissioned by the Narmada Planning Group, Mehta and Sabnis collected data pertaining to various diseases. Malaria, scabbies and other skin diseases and dysentery and diarrhoea are the leading diseases; the combined share of these three ranged from 51 per cent to 75 per cent in the three sub-regions stretching from Henf to Kantiajal.

Of these, malaria topped the list in all the sub-regions, and accounted for from 25 per cent to 36 per cent of the total number of cases. Among the factors contributing to the high incidence of malaria, the following have been emphasized: (i) close proximity of habitation and the resulting contaminated water, as occasioned by the establishment of the Gujarat Mineral Development Corporation Colonies; (ii) immigration of labour from other parts with the initiation of dam construction; (iii) formation of water pockets resulting from the practice of lift irrigation. "It may be surmised, therefore, that the incidence of malaria is directly related to population density, poor local sanitation, influx of outside people who are vectors, etc²⁶."

As noted earlier, the dam is yet to rise above its foundation and the likely effect of the dam on health *vis-a-vis* malaria incidence will

emerge only in course of time. However, one may hazard a guess that the disease incidence is apt to be accentuated.

(*Note: Case 1.2 deals specifically with the Narmada Valley Project.*
— *Editor.*)

AGRICULTURAL POLICY — HEALTH LINKAGE: Policy Options

A. POLICY OPTIONS ON PESTICIDE USE:

LEGISLATION — IS IT ENOUGH?

Some countries have no legislative measures enacted, while others need to strengthen their laws to control production or importation of pesticides and their distribution. Most legislative measures are devoted solely to control measures and little attention is paid to the effects of human exposure to pesticide and the implementation of monitoring activities to ensure judicious use. It was pointed out that there is a strong need for interdisciplinary and interinstitutional coordination to avoid duplication of effort.

It was felt that controlling the use of pesticides by legislative measures or administrative procedures alone is not simple. The vested interests of industry, both the manufacturers of the pesticides as well as the producers of the agricultural commodities, are involved. If one type of pesticide is banned, another will almost automatically appear in the market claiming to be less harmful and more effective.

Effective measures to prevent or decrease the adverse health effects of pesticides should be sought, and the cost of these measures should be borne by the manufacturers. In this way the “polluters pay” principle would be observed. At the same time, pesticide manufacturers should provide proof that their products, which in principal

This policy options presented here emerged from the deliberations on the cases in this module in “The Implications of Public Policy on Health Status and Quality of Life: A Symposium, Bangalore, 18–26, October 1989, World Health Organization, SEARO, New Delhi”.

are less harmful or harmless to health, would not leave behind any toxic residue in soil, agricultural products or animals.

Research and development on pesticides should be encouraged at country and regional levels. Relevant departments in universities and institutes could provide the necessary assistance in carrying out research and experiments in this area.

COMMUNITY INVOLVEMENT

While existing legislation on pesticide use is fairly adequate in some of the countries, the actual implementation of these legal provisions has not been satisfactory. One of the reasons for this is the limited capacity to install an adequate supervisory mechanism due to cost implications in employing sufficient staff. Another reason is as a result of human failure.

In order to overcome these problems in implementation and bring about the desired results in the control of pesticides and reduction of adverse effects, pressures exerted through society or the community would be very effective. Community involvement and popular participation in surveillance and monitoring of the use of safer products and safety measures should be fostered. In some countries the task could be started immediately since there have already been successful instances of the participatory approach to planning, implementation, monitoring and evaluation.

PESTICIDE EPIDEMIOLOGY AND TOXICOLOGY IN HEALTH CURRICULA

Pesticide epidemiology and toxicology should be introduced in health curricula to enable health personnel to analyze and prevent additional health problems caused by the use and misuse of pesticides. In some countries traditional pest control practices exist and are used effectively and these should be encouraged. Research on alternative cropping patterns and biotechnology should be carried out to develop safe and cost-effective methods of pest control. In these endeavours cooperation of relevant international organizations should be solicited if necessary.

DISSEMINATION OF KNOWLEDGE THROUGH MEDIA

Much can be done to mitigate the ill-effects of pesticides if people are made aware of the harmful effects. In the face of widespread

illiteracy, alternative means to written messages should be found to inform people of the harmful effects of pesticides, and how to apply safety measures. The media should be utilized to inform farmers and users of pesticides on how pesticides should be handled, used and stored.

B. POLICY OPTIONS ON LARGE SCALE WATER DEVELOPMENT PROJECTS

HEALTH IMPACT ANALYSIS ASSESSMENT

In order to prevent and control these health conditions epidemiological surveys of the command area must be carried out prior to the implementation of such projects. New diseases that migrant laborers and other people coming to the area may bring with them should be taken into account in the health profile of the area and health interventions undertaken as required. Health impact analysis should include the following:

- (a) epidemiological study of the affected area;
- (b) identification of probable diseases associated with the impounding of water in big reservoirs;
- (c) base line health profile of the migrant people and local population to find out the possible morbidity pattern.

The Ministry of Health should play a pivotal role in persuading the concerned sector, or sectors, such as ministries of Agriculture, Water Resources, and Interior to introduce control and prevention measures during all phases of the project. To facilitate this process it was suggested that an organizational mechanism should be set up highlighting health impact considerations in non-health ministries. Representation from ministries of health has so far been neglected in committees responsible for providing guidelines for the implementation of large scale water development projects, as well as in committees that oversee the implementation.

In some countries committees have already been set up with representation from all the sectors concerned. Steps need to be established so that these sectors share the responsibility for carrying out epidemiological and other health studies required, the costs of which should be incorporated in the project costs.

SURVEILLANCE AND MONITORING

Appropriate methods of surveillance and monitoring of health status, including early warning of emerging health hazards should be developed and followed through during the implementation of the project. In this connection the formation of independent watch dog groups (social organizations, NGOs) is helpful. Every effort should be made to promote them at the local level to assist people in obtaining promotive, preventive, curative and rehabilitative services, as well as in securing compensation for displacements or suffering caused by the project.

BEARING THE COST OF CONTROL AND REMEDIAL MEASURES

The externalities of a project such as deterioration of health status, loss of income, adverse environmental effects due to massive deforestation should be included in the costing of the project during the feasibility study. As an example of costing, mortality and morbidity rates could be studied and baseline data established so that curative measures are calculated for the restoration of the health status to bench mark level at least.

In many instances in spite of the availability of control measures and the technology to implement them, they fail to be accommodated on the pretext that the unit cost of production would be too high, thereby rendering the project infeasible. Even when control and safety measures are included in the formulation phase of the project, these are the first to be removed when austerity measures are applied. Many are unaware, or do not appreciate, that the costs incurred to cure health problems created are sometimes higher than the costs of taking preventive measures.

An example of inadequate planning occurred when the drainage component of an irrigation dam project in a country was removed in a drive to cut down project expenses. No one noticed that only economic parameters were used for monitoring, while all health status parameters had been omitted. A few years after the completion of the project a serious malaria epidemic occurred of such magnitude that the country and policy makers had, and still have, great difficulty in containing it. The resulting costs have proved to be very high.

When the cost of prevention and control of adverse health impacts is not borne by the project somebody still has to pay the cost. This is usually the health sector operating under stringent budgets, or the

individuals themselves.

ROLE OF INTERNATIONAL ORGANIZATIONS

International agencies should play an active role in mobilizing the necessary resources to help countries introduce all the safeguards required in large scale water development projects. A good example can be seen in the case of the Narmada Valley project where the World Bank emphasized the need to analyze the environmental issues, as well as the hazards to health, so that the preventive measures required could be accommodated.

C. SUGGESTION FOR FURTHER POLICY ANALYSIS

Work through the policy options in Sections A and B, outlining the advantages and disadvantages of each. Decide which of these, or any other, you would adopt, and give reasons for your choice. Explain the anticipated difficulties in implementing these, and identify opposing views which might be expressed, and identify wherever possible individual groups that would hold these opposing views. Outline how you, as a policy maker, would defend the policy options you have chosen and explain the strategy you would use.

OCCUPATIONAL HEALTH HAZARDS AND SAFETY IN INDIAN INDUSTRIES

INTRODUCTION

Industrialization, directly and indirectly, can have a substantial effect on population. But industrialization is invariably associated with adverse health effects in the form of various types of health hazards such as silicon dust causing diseases (*silicosis*), cotton dust causing diseases (*byssinosis*), noise induced hearing loss or even deafness, coal dust causing diseases (*pneumoconiosis*) to name a few important ones, air and water pollution, various types of accidents causing disability or even deaths due to lack of adequate safety measures etc.

Developed countries have, through their various research efforts, found out the adverse health consequences of various industrial activities, although further research and investigations are still continuing. Efforts have also been made through various training and educational programmes for the education and awareness of workers, trade union and management about the existence and seriousness of various possible occupational diseases. Simultaneously appropriate equipment have also been designed to provide adequate safeguards. Needless to say that effective legislations have also been formulated and appropriate organization structures have been developed and staffed with qualified and trained manpower for proper implementa-

This case was prepared by Ranajit Dhar, Indian Institute of Management, Bangalore. It is intended as a basis for discussion rather than to illustrate either effective or ineffective handling of an administrative situation. Funds for its preparation were provided by a grant from WHO. Case II.1.

tion of promotional and preventive measures. And where such measures failed, provisions for cure of occupational health diseases, disabilities etc., have been made.

But this is not the case in developing countries which have embarked on a strategy of industrialization.

INDIAN ECONOMY — THE INDIAN CASE

India, according to 1981 census, had a population of 685.2 million with an average density of 208.45 persons per sq.km. The total area of the country is 3.287 million sq.kms. Rural population constitutes about 76.7% of the total and the balance 23.3% are urban. Annual growth rate of population during the period 1971–81 was 2.256%.

The life expectancy at birth has been consistently increasing during the last four decades. It has reached 54.1 for males and 54.7 for females in 1980¹.

The Net National Product at factor cost and at current prices for the latest year 1987–88 was Rs. 257,813 crores (1 crore = 10 million). With the estimated mid-year population of 785 million, the per capita income works out at Rs. 3284.2.

The manufacturing sector constitutes only 18.8% of Gross Domestic Product of the economy, with registered factories 12.1% and balance 6.7% being the contribution of the non-registered manufacturing units.

The employment in the registered factories in Indian industries has been growing at 3.2% during 1951 through 1983–84, from a level of nearly 3 million in 1951 to about 8 million in 1983–84.

In 1951 textiles were the biggest employers with nearly 40% of total. Textiles continued to be the biggest employer in 1983–84 also but its share to the total went down to little over 20% during that year. The second biggest employer in 1983–84 was Electrical and General Machinery manufacturing sector, followed by Basic Metals, Chemicals, Transport Equipment and Non-metallic Mineral products.

ASSESSMENT OF HEALTH HAZARDS AND SAFETY

The Factories Act 1948 (63 of 1948) as amended by Act 20 of 1987 which provided in the First Schedule the list of 29 industry groups involving hazardous processes. The same Act also has provided in the Third Schedule the list of 29 notifiable diseases. These lists are

produced respectively in Exhibits 1 & 2.

It is not possible at this stage to provide an exact figure of the number of workers reported to have been affected by various occupational health diseases as such information are not systematically recorded. However, based on the research work done by the National Institute of Occupation Health (NIOH), Ahmedabad, Industrial Toxicology Research Centre (ITRC), Lucknow, and on various medical research publications^{2,3,4}, it was possible to give a crude idea of the likely existence of various occupational health diseases under Indian conditions. These data are provided in Exhibit 3.

More information is available in the Second Citizen's Report⁵ of the Centre for Science and Environment, New Delhi, on various occupational health hazards in India.

The major occupational diseases discussed in this study are:

- I. Silicosis
- II. Asbestosis
- III. Byssinosis
- IV. Pneumoconiosis.

Silicosis is caused by dust containing free silica or silicon dioxide. It was reported in India in the Kolar Gold Mines as early as in 1947 and subsequently in various other mines and industries.

The slate pencil factories of Mandsaur in Madhya Pradesh are a shocking case in point. There are some 90 Slate Pencil Cutting units in that area and almost the entire population are employed in this factory for their livelihood. It was found that there is hardly a man alive over 40 years of age. According to the observations of a study of 605 Mandsaur workers in six units, conducted by the National Institute of Occupational Health (NIOH) in 1981, "This is a dry process and during cutting by electronic saw, dust is generated in clouds and pervades the factory atmosphere.... The cutter is at a special risk, principally because the dust arising during cutting is directed towards his face." The dust, with 50 to 55% silica, is breathed in directly and the first symptom of silicosis after six months are cough and cold, followed by chest pain etc. This study found that 55% of the workers had silicosis and 18% had advanced form of the disease. The local doctor estimates that about 150 persons die every year and during the last 25 years at least 3,500 people have died.

The Centre for Education and Documentation (CED) in Bombay in 1983, states that the widespread and as yet not reported instances of asbestosis is best summed up by Dr. S.R. Kamat of KBM Hospital, Bombay, who notes "there is no doubt that one-third of the workers in asbestos factories are suffering from asbestosis."

The Central Labour Institute (CLI) in Bombay has found that 38 out of 850 workers in an Asbestos Cement factory in Faridabad are suffering from this disease. A similar study by NIOH of 850 workers of Asbestos Cement in Bombay revealed that 22% workers suffered from an advanced state of this disease.

Asbestosis was notified as an occupational hazard by amendment to the Factories Act in 1976. Mr. M.L. Gadkari, former Chief Inspector of Factories in Maharashtra underlines, "The moment a disease becomes notifiable it just disappears. Take for example, the case of Byssinosis. The disease was made notifiable at the same time as Asbestosis, but it has practically never been heard of despite the profusion of Cotton Textile Mills in and around Bombay."

Textiles and other fibre-based industries employ 1.05 million people while cotton mills alone account for 0.8 million. Textile workers who have been employed for more than 20 years are affected by Byssinosis.

The KBM and MGH hospitals and CLI in Bombay studied 3 cotton mills during 1970-75. The overall incidence of byssinosis was observed to be 12%, the rate being higher in the carding section. Byssinosis has been reported in Cotton Textile Mills in Ahmedabad, Bombay, Delhi, Kanpur, Madras, Madurai and Kanpur with the incidence varying from 6% to 20%.

A recent epidemiological study conducted by NIOH (by Dr. J.R. Parikh and others) on the prevalence of Byssinosis in Textile Mills of Ahmedabad observed that the mean prevalence of byssinosis in the blow section was 29.62%, while in the card section it was 37.83%. This study is based on a sample of 929 workers from the spinning department of three textile mills of Ahmedabad.

Pneumoconiosis better known as the source of "black lungs" is associated with the workers who are long exposed to coal dust. This disease not only makes the workers incapable of hard work but also has proven to be fatal.

A random survey by the Central Mines Research Station at Dhanbad

revealed that 8% of the miners suffer from this disease. This percentage seems to be under-estimated because even in the United States the percentage is higher. According to Dr. P.K. Dutta, former President of the Indian Medical Association, about 6 out of 10 miners are physically unfit to undertake "hazardous and back-breaking jobs in part because of their exposure to dust."

According to sample survey by Dr. M.K. Sinha, Deputy Director of the Central Mining Research Station, Dhanbad, over one million workers are exposed to silicosis as well. Of a group of 150 workers studied, 10% had an advanced form of the disease. If the workers work six hours a day, drilling stones, he dies in just 5 years. He further points out "if you take the man away from the job, he may survive but he will no longer be able to work".

The growth of Indian Chemical Industries during the three decades during 1950–1980 has been phenomenal. According to Dr. C.R. Krishnamurthy, former director, Industrial Toxicology Research Centre in Lucknow, adverse health affects associated with exposure to chemicals in the work environment have been well documented in India. But it is not clear how far the background of health situation of the workers living as they do in unhygienic surroundings exacerbates the toxic effects triggered by chemicals in the work environment.

Chemical Units manufacturing insecticides is of particular concern for creating occupational health hazards. NIOH, which studied the same industry during 1978–79, confirmed "toxicity symptoms such as headache, vomiting, nausea, stomach-ache, skin and eye irritation, respiratory complaints manifested themselves either singly or in combination in majority (73%) of exposed subjects".

The CLI studied 360 workers in a Lead-acid Storage Battery Unit in Bombay and found that around 9% suffer from lead poisoning while two-thirds are exposed to airborne lead in excess of threshold value. Those affected complain of loss of muscle power, colic and exhaustion.

Data are available on industrial injuries¹ in factories for the various years during 1951 through 1982 from Labour Bureau, Ministry of Labour, Government of India. The data are also provided separately for fatal and non-fatal cases. In 1951 the number of factory workers involved in fatal injuries were only 234 which meant an incidence rate (per 1000 workers) of 0.09. This incidence rate went on increasing over the years reaching a peak of 0.17 in 1976. After 1976

it went on declining. It declined to a level of 626 fatal injuries in 1982 with an incidence rate of 0.12.

The incidence rate of non-fatal injuries on the other hand was quite high. It was 29.84 in 1951 with a total number of workers involved to the tune of 75,713. This incidence rate also went on increasing over the years till 1971 to a level of 75.52 and then started declining. It declined to 62.87 in 1982.

Figures are also available on compensation paid¹ on injuries under Workmen's Compensation Act in cases where workers were not covered by ESI Act, 1948. In 1983, 948 deaths, 2,272 permanent disabilities and 39,252 temporary disabilities cases were given compensation of Rs. 13.7 million, Rs. 6.7 million and Rs. 5.5 million respectively, i.e. a total of Rs. 29.5 million or about Rs. 3 crores.

IMPLEMENTATION

There are a number of legal provisions to protect the workers against health hazards and injuries. The Factories Act, 1948 is the most important⁸. This Act was amended in 1987 and suitable clauses were included to make it more effective in relation to health hazards and safety after the Bhopal tragedy on December 3, 1984. It will be interesting here to present certain facts about the Bhopal Tragedy from the study by Gladwin⁹.

The root cause of the Bhopal tragedy was the leakage of forty tons of highly toxic, vaporized methyl isocyanate (MIC) escaped from a storage tank at a pesticide plant 50.9% owned by Union Carbide. The gas cloud enveloped half the city, killing more than 2,000 people (by some estimates more than 5,000) and injuring as many as 2,00,000, mainly causing lung and eye damage. This 'worst industrial accident in history' stunned both India and the world, and created widespread 'Chemophobia'. This called for an international code of conduct and safety assistance programmes for the developing countries. Gladwin has provided the analysis of both corporate and Government failures.

Gladwin listed the following aspects of corporate failures:

1. Failure to Anticipate
2. Failure to Equip
3. Failure to Inform
4. Failure to Control, and
5. Failure to Comply

One member of the Union Carbide team that had performed the 1982 operational safety survey at Bhopal admitted to the Press that the safety systems of the Indian plant had not been “upto American standards....”

The Government failures listed are:

1. Failure to Anticipate
2. Failure to Equip
3. Failure to Inform and
4. Failure to Control.

It is not clear when the last in-depth Government inspection of the Bhopal Plant took place. The Chief Inspector of Factories, however, stands accused of having renewed the Union Carbide factory licence annually without considering earlier safety lapses. The Secretary of the Indian National Trade Union Congress told the Press that inspections of the plant by local officials were rather irregular and superficial, with the consequence that “complicity of Government officers” in the tragedy is a distinct possibility.

In addition to corporate and Government failures it can also be mentioned here that there was no evidence of any kind of trade union pressure on the management to take advance precautionary measures in this matter.

The relevant portions of the Factories Act is presented in Exhibit 4. There are other Acts for specific categories of employees such as Mines Act 1951, Plantation Act 1951, Indian Dock Labour Act, 1934 etc., with provisions similar to those of Factories Act.

The Employee's State Insurance Act, 1948¹⁰ provides a measure of security and health insurance on a contributory basis from workers, Managements and the Government to certain categories of employees. Exhibit 5 provides the relevant salient features of this Act.

The Workmen's Compensation Act, 1923¹¹ is another important Act which provides for monetary compensation to be paid by the employers for fatal as well as non-fatal injuries including occupation diseases when they are not covered by ESI Act, 1948.

Occupational health care is the responsibility of multiplicity of agencies like Ministry of Labour, Ministry of Health, Employees' State

Insurance Corporation etc.

Enforcement of the Factories Act is under the jurisdiction of Department of Factories. The main functions of the Department of Factories are to see that the provisions relating to safety, health and welfare of the workers are properly enforced to achieve the desired results. The main functions of the Department of Factories are presented in Exhibit 6.

In Department of Factories in each state, there will generally be one or two Chief Inspector of Factories, Additional Chief Inspector of Factories, Joint Chief Inspector of Factories, Deputy Chief Inspector of Factories, Senior Inspector of Factories, Certified Surgeon, Chemical Inspector of Factories, Chief Medical Officer, Medical Inspectors etc. The number of factories per inspecting staff varies widely. It varies from a low figure of 106 in Orissa to as high as 533 in Karnataka. As per the All India norm and also as recommended by ILO, there should be a Factory Inspector for every 150 factories so that each unit can be visited frequently for assessing the working conditions and for taking appropriate actions. (See Exhibit 6.)

As per the report of the Task Force on Safety and Hazardous industries in Karnataka, 1986¹² the Department of Factories generally has inadequate manpower, lack of training, inadequate transport, communication and other infrastructure facilities. In Karnataka for example as per the report of the same Task Force, nearly 60% of the registered factories remain uninspected. The other 40% are visited on casual basis. The second and third inspections carried out are extremely rare.

This Task Force however, took note of the fact that proposal for reorganizing the department were being considered by the Government.

Curative health care is usually the function of the Department of Health or the Employees State Insurance Corporation (ESI).

The unorganized sectors are thinly spread over the entire country. Mostly these work places do not come under the purview of any legislation or labour laws. The working conditions depend upon the employers' financial resources and attitude towards their workers. Unregulated working hours, low wages and virtual absence of health, welfare and proper hygienic facilities add to the misery of the workers in this sector of industry. As mentioned, nearly 7.7 million people in 1981 were employed in the various household industries of the

country. The main types of industries which generally cause occupational health disorders are Quartz Crushing, Agate, Slate-Pencil and Ceramics industries, Carpet Weaving, Foundries, Chemical Dye and Pesticides industries. The main affected diseases are silicosis, respiratory allergy and lung diseases, chemical dermatitis and various chemical poisoning.

Each large industrial unit in Private and Public Sectors will have their own medical set-up with full time Medical Officers and hospital facilities in most cases. The emphasis in these cases is mostly on curative health care and not prevention.

Medium type of factories employ part-time medical doctors who are responsible for attending to the day to day health problems of workers. Some workers upto a certain wage category in these types of industries are provided medical benefit under the ESI scheme.

In every large industrial unit there is a separate unit for industrial hygiene — preferably within the medical department. In some it may be under the safety department.

Every organisation should work out safety policy and programmes, and have a full-time safety director along with other necessary professional staff and a safety committee. Safety education at all levels of management personnel and for employees is vital for any successful safety programme.

The Small Scale Industries and Household Industries have no organized occupational health services. Their needs are met mostly by private practitioners or by Government Hospitals if there are any.

It appears that so far as occupational health is concerned in India, there is more or less a complete vacuum. Even the organized sectors of the industries do not have a clear idea about the extent of occupational health problems.

The story of a case of Byssinosis as presented in Exhibit 6 is representative of a typical situation.

ROLE OF TRADE UNIONS

Robert Murray¹³ has provided a good account of the role of trade unions in tackling the problems of health hazards and safety. According to his paper, the role of trade unions in making an effective, articulate and constructive contribution to the health problems of workers was recognised in U.K. as early as the 1920s. It was felt

necessary that the trade unions should have medical advice for this purpose. Dr. Murray himself served as a Medical Adviser of The Trade Union Congress in U.K. Like U.K. other industrialised countries like Sweden, U.S.A, Eastern European countries like Czechoslovakia, USSR have Medical Advisers for their trade unions.

The Trade Unions in the industrialised countries are frequently called upon to assist Government Commissions and other Public Committees. These Medical Advisers on many occasions had attended many such meetings as additional trade union delegates.

This way labour unions were instrumental in suggesting and asking for several investigations into hazardous processes which finally led to regulations for the improvement of medical services and working conditions.

Though the State–Employer–Union relations within India and other countries are different, Indian trade unions have much to learn from the way the unions in the industrialised countries supervise the health and safety of workers.

The All India Trade Union Congress (AITUC) is linked ideologically with the communist philosophy and had in 1979 about 1.3 million members.

The Indian National Trade Union Congress (INTUC) has active support and encouragement from Congress leaders and had 2.3 million members during 1979.

Hind Mazdoor Sabha (HMS) exposes the socialist philosophy and had 0.85 million members during the same year.

The Centre of Indian Trade Unions (CITU) which owes its allegiance to Communist Party of India (Marxist) and had 0.82 million members during the same year.

Other national trade unions are United Trade Union Congress (UTUC), The National Labour Organisation (NLO) Bharatiya Mazdoor Sangh (BMS) and the Hind Mazdoor Panchayat (HMP).

At the industry level we have Textile Labour Organisation, Ahmedabad (TLA). There are also several local unions centred around a particular plant or a multi-plant organisation.

The main function of the trade unions in India is to organise workers for improving their terms and conditions of employment. Many trade unions, however, provide a variety of other services. They include i)

communication ii) welfare activities iii) educational activities and iv) research. However, unlike in the Industrialised countries such as UK, USA, USSR etc, the role of trade unions in India in tackling health hazards and safety appears to be insignificant.

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EXHIBIT 1

List of industries involving hazardous processes*

1. Ferrous Metallurgical Industries

- Integrated Iron and Steel
- Ferro-alloys
- Special Steels

2. Non-ferrous Metallurgical Industries

- Primary Metallurgical Industries, namely, zinc, lead, copper, manganese and aluminium

3. Foundries (ferrous and non-ferrous)

- Castings and forgings including cleaning or smoothening/roughening by sand and shot blasting

4. Coal (including coke) industries

- Coal, Lignite, Coke, etc.
- Fuel Gases (including Coal Gas, Producer Gas, Water Gas)

5. Power Generating Industries

6. Pulp and paper (including paper products) industries

7. Fertilizer Industries

- Nitrogenous
- Phosphatic
- Mixed

8. Cement Industries

- Portland Cement (including slag cement, puzzolona cement and their products)

*The First Schedule. Factories Act, 1948 as amended by Act 20 of 1987 (w.e.f. 1st December 1987).

9. Petroleum Industries

— Oil Refining

— Lubricating Oils and Greases

10. Petro-chemical Industries

11. Drugs and Pharmaceutical Industries

— Narcotics, Drugs and Pharmaceuticals

12. Fermentation Industries (Distilleries and Breweries)

13. Rubber (Synthetic) Industries

14. Paints and Pigment Industries

15. Leather tanning Industries

16. Electroplating Industries

17. Chemical Industries

— Coke Oven By-products and Coal-tar distillation products

— Industrial Gases (nitrogen, oxygen, acetylene, argon, carbondioxide, hydrogen, sulphur dioxide, nitrous oxide, halogenated hydro-carbon, ozone, etc).

— Industrial carbon

— Alkalis and Acids

— Chromates and dichromates

— Lead and its compounds

— Electrochemicals (metallic sodium, potassium and magnesium, chlorates, perchlorates and peroxides)

— Electrothermal products (artificial abrasive, calcium carbide)

— Nitrogenous compounds (cyanides, cyanamides and other nitrogenous compounds)

— Phosphorous and its compounds

— Halogens and Halogenated compounds (Chlorine, Flourine, Bromine and Iodine)

— Explosives (including industrial explosives and detonators and fuses)

18. Insecticides, Fungicides, Herbicides and other Pesticides Industries
 19. Synthetic Resin and Plastics
 20. Man-made Fibre (Cellulosic and non-cellulosic) industries.
 21. Manufacture and repair of electrical accumulators
 22. Glass and Ceramics
 23. Grinding or glazing of metals
 24. Manufacture, handling and processing of asbestos and its products
 25. Extraction of oils and fats from vegetable and animal sources
 26. Manufacture, handling and use of benzene and substances containing benzene
 27. Manufacturing processes and operations involving carbondisulphide
 28. Dyes and dyestuff including their intermediates
 29. Highly flammable liquids and gases
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EXHIBIT 2

The list of notifiable diseases*

1. Lead poisoning, including poisoning by any preparation or compound of lead or their sequelae.
2. Lead tetra-ethyl poisoning
3. Phosphorous poisoning or its sequelae.
4. Mercury poisoning or its sequelae
5. Manganese poisoning or its sequelae
6. Arsenic poisoning or its sequelae
7. Poisoning by nitrous fumes
8. Carbon bisulphide poisoning
9. Benzene poisoning, including poisoning by any of its homologues, their nitro or amino derivatives or its sequelae.
10. Chrome ulceration or its sequelae
11. Anthrax
12. Silicosis
13. Poisoning by halogens or halogen derivatives of the hydrocarbons of the aliphatic series
14. Pathological manifestations due to —
 - a) radium or other radio-active substances;
 - b) X-rays
15. Primary epitheliomatous cancer of the skin
16. Toxic anaemia
17. Toxic Jaundice due to poisonous substances
18. Oil acne or dermatitis due to mineral oils and compounds containing mineral oil base.
19. Byssinosis
20. Asbestosis

*Re-numbered in Factories Act, 1948 as amended by Act 20 of 1987 (w.e.f. 1st December 1987).

- 21. Occupational or contact dermatitis caused by direct contact with chemicals and paints. These are of two types, that is, primary irritants and allergic sensitizers.
- 22. Noise induced hearing loss (exposure to high noise levels).
- *23. Beriyillium poisoning
- *24. Carbon monoxide
- *25. Coal miners' pneumoconiosis
- *26. Phosgene poisoning
- *27. Occupational cancer
- *28. Isocyanates poisoning
- *29. Toxic nephritis

EXHIBIT 3

Possible occupational diseases in different industries

<i>Industry</i>	<i>Possible Occupational Diseases</i>
1. Chemical Industries	<ol style="list-style-type: none">1. Lead, Phosphorous, Magnatium, Carbon-bi-sulphate, Chromates, Halogen poisoning2. Toxic Anaemia3. Cancer (skin)4. Toxic Jaundice5. Carbon Monoxide Poisoning6. Toxic Nephritis (Kidney)7. Cyanide Poisoning8. Beriyillium Poisoning
2. Gas Industry (Sulphur-dioxide, Chlorine, Sulphuric acid etc.)	<ol style="list-style-type: none">1. Respiratory diseases2. Pulmonary Oedema3. Irritant Conjunctivitis4. Irritant Rhinitis5. Bronchitis6. Broncho-pneumonia7. Blindness8. Corneal Ulcer9. Glaucoma10. General weakness11. Gastritis12. Perforation of the stomach and oesophagus13. Erosion of dental enamel14. Empyema

<i>Industry</i>	<i>Possible Occupational Diseases</i>
3. Petrochemicals	<ol style="list-style-type: none">1. Oil Acne2. Dermatitis3. Allergic dermatitis
4. Dyes of Dyestuffs	<ol style="list-style-type: none">1. Cancer (skin)2. Toxic nephritis
5. Highly Inflammable Liquid Gases (acetylene, LPG etc)	<ol style="list-style-type: none">1. Asphyxia2. Narcosis3. Polyneuritis4. CNS disorders5. Muscular incoordina- tions6. Impairment of mental alertness7. Mild narcosis8. Respiratory distress
6. Textiles	<ol style="list-style-type: none">1. Byssinosis2. Chronic Bronchitis3. Noise induced hear- ing loss or deafness
7. Coal	<ol style="list-style-type: none">1. Pneumoconiosis2. Heat stroke3. Emphysema4. Interstitial Fibrosis5. Anthracosis
8. Cement	<ol style="list-style-type: none">1. Bronchitis2. Asthma3. Dermatitis
9. Drugs and Pharmaceuticals and Radiation hazards	<ol style="list-style-type: none">1. Sterility2. Leukaemia3. Polycythaemia4. Bladder cancer

<i>Industry</i>	<i>Possible Occupational Diseases</i>
10. Insecticides, Fungicides, Herbicides and other Pesticides	1. Brucellosis 2. Leptospirosis 3. Actinomycosis 4. Hydatid cyst 5. Psittacosis 6. Tetanus 7. Encephalitis
11. Grain Industries	1. Aspergillus Fumegatus 2. Pulmonary Fibrosis 3. Allergic Alveolitis 4. Brain Fever 5. Mycotoxicosis 6. Conjunctivitis 7. Asthma

EXHIBIT 4

Factories Act, 1948 (With Amendments Upto 1987)

The Factories Act was first passed in 1881 to provide for health and safety measures and to protect child labour. This was later replaced by Acts of 1889, 1922 and 1934 to accommodate the growing complexities of the process of industrial growth.

The Factories Act 1948 which came into force with effect from April 1949 replaced the Act of 1934 to overcome the various inadequacies of 1934 Act. The 1948 Act has been overhauled by Factories (Amendment) Act 1976. The latest amendment of this Act was incorporated in 1987 in the light of Bhopal tragedy on December 3, 1984.

It was intended by the law makers that the ultimate responsibility for ensuring safety, health and welfare of the workers be with the employer, although it is largely recognized that certain violations may be caused due to the negligence of the employers and the employees.

The Act extends to all registered factories in the entire nation. The registered factories are those employing 10 or more workers using power, and 20 or more workers not using power (Section 2m), Section 2(l) defines 'worker' and Section 2(n) defines 'occupier' ie., the person having ultimate control over factory.

Section 2(cb) defines hazardous processes. A list of 29 industries have been given in the First Schedule of this Act which are involved in hazardous processes (presented in Exhibit 1). Section 41-F provides the maximum permissible threshold limits of response of chemical and toxic substances in manufacturing processes (whether hazardous or otherwise) in any factory shall be of the value indicated in the second Schedule of the Act.

Section 89 provides list of 29 notifiable diseases as provided in the Third Schedule of the Act (presented in Annexure II).

Section 90 provides the power to direct enquiry into cases of accidents or diseases.

Section 92 of the Act relates to the penalties of any contraventions of the provisions of the Act. It stipulates that the occupier and manager of the factory concerned can be prosecuted for such contraventions. The punishment of imprisonment and/or fine will depend on the offence committed.

EXHIBIT 5

Employees' State Insurance Act, 1948

The Employees' State Insurance Act 1948 is designed to accomplish the task of protecting the employees as defined in the Act against the hazards of sickness, maternity, disablement and death due to injury and to provide medical care to insured persons and progressively to their families.

The scheme initially covered the employees of non-seasonal power using factories employing more than 20 or more persons.

There is, however, built-in provision enabling the Government by six months' notice in the Official Gazette to extend the provisions of the Act or any of them to any establishment or class of establishments.

This Scheme is administered by a corporate body called the Employees' State Insurance Corporation with members representing employers, employees, the Central Government, State Government, Medical Profession and Parliament.

The Employees' State Insurance funds are built out of contributions from employees and employers and the State Government share of expenditure on medical care.

The amount of Employers' contribution shall be a sum equal to 5% of the wages payable to an employee. Employees' contribution shall be equal to 2 1/4 % of the wages payable to him.

All persons employed for wages not exceeding Rs. 1,600 per month excluding overtime are covered by this Insurance.

The case of any injured person for permanent disablement benefit would be referred by the Corporation to a Medical Board for determination of the disablement.

All occupational health diseases peculiar to the employment in a specific factory will be considered as an employment injury for which proper arrangements for treatment or payment of compensation will be made by ESI.

The employees who are covered by ESI Corporation are barred against receiving or recovery of compensation or damages under any other law such as the Workmen's Compensation Act, 1923.

EXHIBIT 6

Functions Of Department of Factories

The main functions of the Department of Factories are as follows:

1. To approve the location of the factories keeping in view the activities around and the habitation.
2. To approve the building and plant layout so that proper ventilation, lighting, adequate space for movement for workers, exhaust systems etc., are maintained.
3. To ensure that the dangerous moving parts of machines and equipments are adequately guarded to avoid injury to the workers.
4. To see that proper work environment is maintained for safe working.
5. To see that the working hours, rest interval, leave facilities for workers are adhered to as stipulated under the provision of law.
6. To investigate the circumstances leading to accidents in the factories and to take action as per law.
7. To advise the management and workers on measures to be taken to avoid occurrence of accidents.
8. To ensure that proper pre-employment and periodical medical examination of workers is conducted to have proper health record of workers.
9. To conduct enquiries on complaints received from workers, trade unions and others affected.
10. To take samples of cases, dusts, fumes etc., for analysis and to ascertain the safe limits to which workers could be exposed.
11. Assess the level of noise in the work area, to suggest remedial measures and also to take action on the management if stipulated limits are exceeded.
12. To take legal actions on the employees when breaches are noticed.
13. Regulate payment of wages within the stipulated period and also to see that only authorised deductions are made out of the earned wages of the workers.

14. To see that stipulated maternity benefits and medical attention are provided for women workers in factories.
 15. To submit reports on various matters whenever required and also as stipulated under the rules.
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EXHIBIT 7

A Case of Byssinosis

CCTM is a Composite Cotton Textile mill located in Western India. The mill uses medium variety of cotton as raw material and manufactures only cotton cloth. The ventilation in the mill is very poor in the blow and card sections. There is no provision of exhaust device over the carding machines.

Mr. 'W' is one of the 25 workers working in the Card Section. He started his career in this mill 5 years ago and has recently been made a permanent employee.

He is of late found to be quite frequently absent from his section. On questioned by his supervisor Mr. 'S' he complained that he feels chest tightness and occasional breathlessness while working too long in the card section; but whenever he goes out of the card section, he feels better.

Mr. 'S' reported this matter to Mr. 'E', the Engineer.

Mr. 'E' feels that this is a serious matter and the General Manager of the Mill must be informed about it and suitable preventive actions be taken. Mr. 'E' is well aware of the fact that in western developed countries they use latest carding machines with provision of exhaust device for the health and safety of the workers.

The matter became known to the departmental union representative and finally to the union leader Mr. 'U'.

Mr. 'U' mentioned that quite a few other workers have also made similar complaint of chest tightness and occasional breathlessness, but they have requested not to inform the Supervisor about it for fear of loosing their jobs.

Mr. 'U' found that Mr. 'E' is very sympathetic to the workers on this issue and feels very strongly that some preventive measures must have to be taken by the management by replacing the old machines by the latest ones. He has even found out the costs of the new machines and prepared the blue print of a plan for replacement.

Mr. 'U' convened a meeting of the executive committee of the union after sounding the affected workers. The affected workers favour compensation rather than preventive measures because they value short-term gains in the form of monetary compensation more than

the long-term health benefits of better machines.

The union finds fighting for compensation will give them better payoffs in term of its popularity rather than the installation of better machines.

A meeting of the management and the union is called. Mr. 'E' presented his blue print. The management argued that it is not in a position to make such a huge investment for replacement of machines as it is not going to improve at all the financial position of the Mill. The Mill is just able to break even due to demand conditions of their products.

The Union then put their proposal for compensation which is apparently less costly. The management put the same argument of the unfavourable financial conditions of the company, and cautioned that if the workers force the Mill to pay compensation, the Mill will have to be closed down.

The Union then withdrew its demands for compensation at least temporarily.

After a year the Mill's financial position improved. The Union then put its demand for compensation. The Government of India by then included Byssinosis (Cotton dust-induced diseases) as one of the 29 notifiable diseases in the Third Schedule of the Factories Act 1948 as amended by Act 20 of 1987. The Mill also found that some other mills have started replacing the old machines by the new ones.

The Management then ordered a detailed costing for replacement of old machinery, the calculation of present value of annual compensation expenses, and the analysis of various legal provisions for the payment of compensation.

TOILING CHILDREN

INTRODUCTION

The informal industrial sector and farm households are major users of child labour in most developing countries. This is a fact of life no matter how much one debates about a proper definition of child labour. Industrialisation policies may, though not deliberately, lead to increased use of child labour and result in degradation of children's quality of life and health status. Can child labour be dispensed with in the present-day socio-economic scenario? "The worldwide concern for child labour arises," it is observed by ILO, "from the implications for the child's health, physical, educational and intellectual development and for his lifetime opportunities."¹ What can one do to minimise adverse health consequences of children used as labour? These and a myriad other questions on child labour are bothering social scientists, economists and social activists the world over.

BACKGROUND

'World of children', a population bulletin issued by the Population Reference Bureau Inc. in observance of the International Year of the Child 1979 notes:

"Although children below age 15 are not usually considered part of the work force, large numbers of them in the developing world do work. Some 52 million children under 15 were at work around the world in 1978 according to International Labour Organisation (ILO)

This case was prepared by Basu Ghosh, Indian Institute of Management, Bangalore. It is intended as a basis for discussion rather than to illustrate either effective or ineffective handling of an administrative situation. Funds for its preparation were provided by a grant from WHO. Case II.2.

estimates: 29 million in South Asia; 9 million in East Asia; 10 million in Africa; 3 million in Latin America; and one million in developed countries.”²

The report observes further that only 10 million of the World’s 52 million children are paid, though at a rate substantially lower than wage rates for adults.

Estimates of number of child labour in India vary widely:

1981 census	:	14.5 million
1983 Estimates	:	17.4 million
1980 ORG Survey ³	:	44.5 million

‘Concern for working children’ estimate: 100 million.

Even if it is assumed that the number of working children in India is somewhere between 17–45 million, it implies that every second or third working child in the world is found in India. Whereas the world average (% of) paid child labour stands at 20%, only 5% of India’s working children are paid workers. Most of the working children (87%) are engaged in agricultural and related operations such as sowing, harvesting, fishing and livestock rearing. A newspaper editorial argues:

“These tasks are usually handled by rural families forced by penury to seek their children’s assistance. Often the children work alongside their parents and there is hope that they will not be slave-driven. Besides agricultural activities pose little threat to life and limb. It is the remaining 13 percent that work under the most horrendous conditions. They are underpaid, overworked, exposed to harmful chemicals, and in danger of contracting deadly lung diseases and getting deformed or crippled”⁴.

The focus here is on child labour in industries or non-agricultural occupations (See Exhibits 1 and 2 for some relevant information).

WORKING CONDITIONS OF CHILD WORKERS

According to the Indian Council of Child Welfare, child labour usage is found to vary widely among different states:

Match industry (Tamil Nadu), beedi making (M.P, Maharashtra), diamond polishing (Gujarat, Andhra Pradesh), sari embroidery (Delhi, U.P.) fish peeling

(Kerala), glass works (U.P), plantation and tailor aides (Tamil Nadu), food grain smuggling (W. Bengal), brick making (U.P.), and newspaper selling, book binding, shoe shining, handloom (all over India)⁵.

Children also work as helping boys (in *dhabas* ie. way-side restaurants/tea stalls), rag collectors, domestic servants, hawkers, zari workers, car/two wheeler workshop assistants, grocery shop helpers, construction workers, plantation workers etc⁶. It is evident that child labour use is more prevalent in small scale industries and unorganised sectors. Because of the diversity of institutions in which they work, the child labour's working conditions also vary a great deal. Information on this is scanty, and available mainly from a few studies undertaken by individual scholars, and newspaper reports. Here is a brief account.

MATCH AND CRACKER INDUSTRY, SIVAKASI

"As you enter the township of Sivakasi," a newspaper article reports "the severity and intensity of child labour strikes you like lightning"⁷. According to this author about 16,000 children in the 10–14 age group do there "a back breaking chore at the poorly ventilated and highly hazardous match unit." Their work environment is polluted with noxious fumes of phosphorous and other chemicals. Work hours are comparable to that of the adults but wage substantially lower (Rs. 1.35–5.58 per day). To sum up this writer's views, the Sivakasi match industry's child labour working conditions are:

- poor lighting
- unhygienic surroundings,
- dust and fumes,
- poor ventilation,
- cramped conditions, and
- presence of dangerous chemicals in the work environment.

An in-depth study of Sivakasi (where estimated 45,000 children work) reveals:

"Between 3 and 5 a.m. every morning, children in these villages, some as far as 30 km. away, are woken up and loaded into buses or vans belonging to the industries in

Sivakasi town. The children, who put in a nearly 12 hour working day, are therefore away from home for over 15 hours⁸.

This study highlights several facets of working conditions of children in Sivakasi: Wage below minimum prescribed level, frequent fire accidents, inadequate space per head etc.

LOCK INDUSTRY, ALIGARH

A study estimates that there are 7,000–10,000 children working in this industry⁹. The author reports:

“Of all the processes in which children are employed, the activities of polishing, electroplating, spray painting and working on hard presses are the most hazardous for the health of the workers, particularly child workers. The hand presses become particularly dangerous because children are made to work very long hours — anything from 12–14 hours a day.”

Other aspects of working conditions revealed from this study are:

- forced inhalation of emery powder, metal dust, paint or paint thinner,
- unregulated wages,
- noxious fumes which burn the eyes,
- possibility of electrocution,
- late night work.

GLASS FACTORY, FERROZABAD

The study of this factory (which uses roughly 8,000–9,000 children) reveals certain striking features of the working conditions there:

- exposure to high temperature,
- deafening noise,
- frequent industrial accidents resulting in burn injuries to children,
- payment on a piece-rate basis,
- forced inhalation of fumes,
- strain to the eyes, and

- night time work¹⁰.

GEM POLISHING, JAIPUR

The children engaged in gem polishing industry are exposed to many adverse working conditions, which can be summed up as under:

- possibility of injuries to hands,
- unhygienic environment for work,
- strain to the eyes, and
- low wages¹¹.

Available literature indicate many similar situations in regard to working conditions in other industries engaging children¹². In beedi industries, though the children put in the same number of hours as adults, they are paid less. The children used as rag pickers expose themselves to foul air and infective bacteria when they rummage urban refuse dumps as a daily routine. As revealed from a study of child labour in unorganized industries in Greater Bombay, most hotel boys who work in unlicensed stalls (*dhabas*), are required to work in unclean and unhygienic conditions¹³. 50 per cent of garage boys work for more than 9 hours per day. The children working are often required to put in heavy work, and are sometimes even shouted at or beaten.

How important is the child labour income to the families who send their children to work? According to a study conducted in Bombay the child workers were found to contribute Rs. 102/- per month or about 30 per cent of the total income of the households¹⁴. A study of Sivakasi child workers revealed that in 19 per cent of the child labour sponsoring households the children contributed over 50 per cent of household income. In 40 per cent of the child labour sponsoring households the child labour income contribution was in the range of 26–50 per cent¹⁵. The study notes further:

“The complexity of the situation arises because of the conditions of the households that provide the child workers. Over half of the households for which data were available were earning less than Rs. 450 per month including the income from child labour. Almost all the households had less than Rs. 650 per month. Even more significantly, the proportionate contribution of children’s

earnings was the highest in poorest households and fell systematically as the aggregate income increased.”

A recent study of child labour in Bangalore finds that 6 per cent of child labour earn 100 per cent of their family income, while 18 per cent of the child labour generate 50–100 per cent of their family income¹⁶. This study also finds that about 13 per cent of child labour under 10 years of age earn 100 per cent of their family income. (Exhibit 3 presents some information on reasons for entry of children into labour force).

HEALTH CONSEQUENCES OF CHILD LABOUR

Child labour suffer from health problems arising out of the job itself, the environment in which the job is performed, and the adverse conditions of work. Hard data on the health status of working children in India are extremely scarce. To look for the actual health consequences of labour force participation by children will, in all probability, be futile. We will, therefore, discuss about known or potential health effects on children's health, when children work in a variety of industrial environments.

Evidences from the references cited in a recent WHO document indicate:

“Children handling microscopically fine wire develop marked visual impairment within 5–8 years, while children using hand tools designed for adults are said to have a higher risk for fatigue and injury.... Children using seats and work benches designed for adults have more problems in the musculoskeletal system¹⁷.

The child workers in match and cracker factories perform their jobs in such conditions as are “unsafe and detrimental to the mental and physical health of the child”¹⁸. Exposure to chemical dust powders and strong vapours is cited as a potential health hazard for children working in these factories. The fact that child workers are usually paid on a piece-rate basis which itself is very low, forces the children to “work feverishly to ensure maximum output”. Thus the children's food and relaxation needs are not met, and their physical and mental health suffers. Instances are also reported of children succumbing to death, or sustaining bodily injuries, in cracker units. The children are thus exposed not only to accidents but also to occupational health hazards of various types: infections of the upper respiratory tract,

discomfort and posture-related health problems, dermatitis etc.

In lock industry "the activities of polishing, electroplating, spray painting and working on hard presses are the most hazardous..."¹⁹. Here bodily injury (loss of finger tips) is caused by accidents resulting from exhaustion (long working hours) and carelessness. The child workers are exposed also to the health risks of dealing with toxic chemicals, and electrocution (resulting from illegal connections). Instances are cited of child workers suffering from TB, other chest diseases, asthma (or breathing difficulty), accidental poisoning, mental disorder, pneumoconiosis and occupational dermatitis.

In glass factories the children are exposed to the health risks of working in an accident-prone environment, in parts of which the child workers work in unbearable heat²⁰.

Many child workers in the gem polishing industry suffer from TB because of "a combination of unhygienic conditions, overcrowding and malnutrition". Other diseases found among the child workers here are: allergic dermatitis and presmiopia²¹.

A study conducted by TISS, Bombay reveals that the "working children suffer from ambivalence of their adult, parent and child selves in decisions concerning the family"²². They also find it difficult to adjust to social situations different from that of their work situation. The working children seem to be less concerned about personal hygiene.

According to this study, these children have limited social relationships outside their work settings, and this affects "the wholesome development of their personality". Another study of health problems of children working in restaurants reveals that "only 6 (out of 73) children had problems directly related to the type of job"²³.

The statements "it is distressing that the relationship between health and child labour has been very little explored scientifically..." and "it is debatable whether the prevalence of illnesses in working children is higher than those in non-working ones from similar environments or in adult workers" typify the information situation in regard to health consequences of child labour²⁴. It is, however, conceded that severe malnutrition, anaemia, hard labour, fatigue and inadequate sleep make working children more infection-prone. Also, it is recognized that depending on their places of work, the working children do suffer from occupational diseases such as poisoning and toxic effects; accidental deaths and injuries; silicosis, asbestosis and

pneumoconiosis; long lesions and deformities; damage to eyesight; and psycho-social problems. (See Exhibit-4 for more information on Health Consequences of Child Labour).

POLICY RESPONSE TO CHILD LABOUR PROBLEM

Historically speaking, child labour legislation in India dates back to 1881, when the first Factories Act of India was passed. This Act defined a child as any person below 12, and prohibited the employment of children below 7²⁵. Several other pre-Independence Acts covered protection to children viz., Factories Act 1891, Indian Merchant Shipping Act XXI of 1923, Children Pledging of Labour Act II of 1933 and the Employment of Children Act XXVI of 1938. The last mentioned Act of 1938 prohibited the use of child labour (under 15) in transportation-related occupations in railways and posts, and in processes involving bidi making, carpet weaving, cement manufacture and bagging, fire works, mica cutting and splitting, shellac manufacture, cloth printing, dyeing and weaving, soap manufacture, tanning and wool cleaning. The Constitution of India, in its Chapter on Directive Principles of State Policy (Article 24) states: "No child below the age of fourteen years shall be employed to work in any factory or mine or employed in hazardous employment."²⁶ It is further stated "that the health, strength of workers, men and women and the tender age of children are not abused and that citizens are not forced by economic necessity to enter a vocation unsuited to their age or strength." In the post-Independence era, the Indian Factories Act of 1948 stated unequivocally: "No child who has not completed his fourteenth year shall be required or allowed to work in a factory"²⁷. Other Acts e.g., the Plantations Labour Act 1951 and Mines Act 1952, Merchant Shipping Act 1958, Apprentices Act 1961, Motor Transport Workers Act 1961, Atomic Energy Act 1962, Bidi and Cigar Workers (Conditions of Employment) Act 1966 and various Shops and Establishment Acts enacted by the states included clauses pertaining to employment of children. Many of these Acts specified different ages as minimum required to be eligible to work, timings, number of hours of work and rest and medical certification requirements etc.

In August 1974 a document entitled "The National Policy for Children Resolution" was adopted by the Government. This document outlined a policy frame for provision of services for children as part of India's plan for human resource development. As per this policy "no child under the age of 14 years shall be permitted to be engaged in

hazardous occupations or be made to undertake heavy work.” The Government appointed a Committee on Child Labour (Gurupadaswamy Committee, 1979) which stated that:

“Labour becomes an absolute evil in the case of the child when he is required to work beyond his physical capacity, when hours of employment interfere with his education, recreation and rest, when his wages are not commensurate with the quantum of work done, and when the occupation he is engaged in endangers his health and safety, i.e. when he is exploited.”

The most recent legislation pertaining to child labour was enacted in 1986. This Act Child Labour (Prohibition and Regulation) Act 1986 stipulates:

“No child shall be employed or permitted to work in any of the occupations set forth in Part A of the Schedule or in any workshop wherein any of the processes set forth in Part B of the Schedule is carried on:

Provided that nothing in this section shall apply to any workshop wherein any process is carried on by the occupier with the aid of his family or to any school established by, or receiving assistance or recognition from Government²⁸.

Part A above refers to occupations connected with transport of passengers, goods or mail by railway; cinder picking, clearing ash pit, building operation in railway premises; work in railway catering, work relating to or near railway line and port area. Part B lists several processes: bidi making; carpet weaving, cement manufacture including bagging of cement; cloth printing and dyeing, and weaving; manufacture of matches, explosives and fire-works; mica printing and splitting; shellac manufacturing; soap manufacture; tanning; wool cleaning; and building and construction industry.

The 1986 Act also provides for the constitution of a ‘Child Labour Technical Advisory Committee’ to advise the Central Government for addition of occupations or processes to the Schedule. Other aspects dealt with in this Act relate to regulation of conditions of work (hours and period of work, weekly holidays), maintenance of a register of children employed, health and safety, appointment of inspectors etc. In the section on ‘Health and Safety’ the law stipulates that the Government may make rules for ensuring health and safety in

respect of cleanliness in the place of work, disposal of wastes and effluents, ventilation and temperature, dust and fumes, artificial humidification, lighting, drinking water, latrine and urinals, spit-toons, fencing of machinery, protection of eyes, explosive or inflammable dust or gas, precautions in case of fire etc.

A 'National Policy on Child Labour' has been recently announced²⁹. This document recognizes the need to alleviate poverty situation in the country, as necessary for solving the child labour problem, and expresses the hope that national anti-poverty policies, the national education policy, the national health for all policy, nutrition policy and stepped-up social services will all help in this context. The future action programme set out under this policy consists of the following:

1. The legislative Action Plan,
2. The focussing of general development programmes for benefitting child labour wherever possible, and
3. Project-based Plan of Action in areas of high concentration of child labour engaged in wage/quasi-wage employment.

(See Exhibit 5 for Health and Nutrition provision in the national policy).

The national policy has identified ten specific sectors of employment with high incidence of child labour, and proposes a comprehensive strategy comprising a package of measures. (See Exhibit 6 for Project-Based Plan of Action.)

EVALUATION OF IMPACT OF LEGISLATION/POLICIES

In the absence of a comprehensive evaluation of health impact of India's child labour policies, one may consider recent newspaper reports which mirror public thinking on the subject:

In an article entitled "Child Labour Act a Non-starter" a journalist comments:

"Though a comprehensive Act on Child Labour was introduced in 1986 to plug loop holes in the earlier laws, it has till now neither been given the teeth it needs to make it effective nor succeeded in deterring poor parents or rich employers from exploiting children"³⁰.

Some of the pertinent issues raised in this context are:

- role of states in enforcing the Act,
- extent of, and effectiveness of, protection of interests of children in the unorganized sector,
- possible impact of greater regulation of child labour in the organized sector, and
- adequacy of enforcement machinery.

While presiding over the meeting of the Technical Advisory Committee on Children Board in April, 1989 the Prime Minister is reported to have emphasized the need for a change in the social and economic environment of the areas where children are employed. He also proposes consideration of a special tax on some of the hazardous industries employing children and dedicate these funds for improving the working children's lot by provision of educational and other services³¹.

Another newspaper report comments:

“The Child Labour (Prohibition and Regulation) Act 1986 has not helped the matters; as it does not cover the unorganized sector where majority of the nearly 18 million child labour cases are found”³².

The Technical Advisory Committee on Prohibition and Regulation of Children, Ministry of Labour, ILO and other agencies concerned are cooperating to ameliorate the bane of child labour in India.

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EXHIBIT 1

**Economic Activity-wise Distribution of Child workers
(1971 Census)**

<i>Economic Activity</i>	<i>Total No. of children ('000)</i>	<i>Per cent Share</i>	<i>Children as % of total workers</i>
1. Agriculture	3,870	36.03	6.95
2. Agricultural labour	4,856	42.76	9.65
3. Livestock, forestry, fishing and allied activities	885	8.24	20.59
4. Mining	24	0.22	Negligible
5. Industry			
a. Household	338	3.14	5.32
b. Others	315	2.93	2.98
6. Construction	59	0.55	2.66
7. Trade and commerce	211	1.96	2.10
8. Transport and communication	42	0.39	0.95
9. Other services	405	3.77	2.56
Total	10,735	100.00	5.95

Source: "Child Labour in India: Proceedings of a Regional Seminar Feb 26–28, 1985) Ahmedabad: Gandhi Labour Institute 1986.

EXHIBIT 2

Employment of Children in Factories

<i>Year</i>	<i>No. of children</i>	<i>% of children to total workers</i>	<i>Year</i>	<i>No. of children</i>	<i>% of children to total workers</i>
1892	18,880	5.90	1952	6,159	0.25
1912	53,700	6.20	1963	5,056	0.20
1923	74,290	5.50	1954	4,695	0.18
1933	19,091	1.40	1955	4,975	0.19
1939	9,403	0.50	1956	4,310	0.15
1943	12,484	0.50	1960	3,220	0.10
1948	11,444	0.48	1962	N.A	0.07
1950	7,764	0.31	1970	N.A	0.05
1951	6,853	0.27			

Source: C.B. Mamoria and S. Mamoria. "Some Aspects of Industrial Labour in India". Allahabad: Kitab Mahal 1983. p.148.

EXHIBIT 3

Reasons for Entry into Child Labour Force

1. The O.R.G national survey of working children in India (1980) reports that 47.5% of these children say that they join the labour force at the instance of their parents.
2. According to an ILO Survey (1979), 23.4% of the working children cite poverty as their reason for working, 32.4% to assist parents and 26.3% because of parents wanting them to work.
3. An ICSSR (1982) study of child labour in unorganised industries in Greater Bombay reveals: 74% of these workers (who mostly live in slums) join the labour force because of economic necessity.
4. A possible reason for children being attracted to work is the preference of employers, as can be perceived from the comments of R. Akhileshwari (1982): "Child workers are preferred over adults for several reasons. Children are docile, they do not grumble or revolt, they are agile, working faster than adults. Most important they can be paid less, or sometimes nothing at all under the pretext of training."
5. Yet another phenomenon is the high drop-out rate of children from schools which is linked in a vicious cycle that pushes children to work. This is related not only to poverty, but also to inadequacies of our education system.
6. It is possible, as S.K. Modi (1988) observes, that labour force participation of children causes wider unemployment among adults. which further pushes up the incidence of child labour.

EXHIBIT 4

Health Consequences of Child Labour

(Extracts from the First Report of the Child Labour Technical Advisory Committee, July, 1988)

1. As far as the manufacturing of slate pencils is concerned, however, there is evidence from a study conducted by the National Institute of Occupational Health, Ahmedabad in 1985 that conglomerate silicosis develops among workers engaged in this industry and those who start work at a younger age have a higher mortality rate. This would mean that children are more susceptible to occupational hazards than adults in this industry.
2. The T.A.C. observed that a study had been done by the Industrial Toxological Research Centre, Lucknow which revealed that among 342 workers studied in agate industry, 18.4 per cent had pneumoconiosis. The study also observed that the prevalence of pneumoconiosis increased with the increase in the duration of exposure being 9 per cent among those with less than 5 years' exposure, 22.2 per cent among those with 6–10 years' exposure and 37.3 per cent among those with exposure of 11 years' or more. Thus those workers who enter employment as children are at a greater risk of contracting this disease.
3. A well executed study by NIOH, Ahmedabad on 100 adult beedi workers and 50 otherwise matched controls revealed the higher concentration of nicotine in the exposed workers as compared to controls. The impact of this showed symptoms such as vomiting, headache, giddiness, weakness and loss of appetite amongst 64 per cent of the exposed workers. The symptoms were reported to have manifested only during work days after heavy dust exposure especially during summer. None of the control subjects had any of these symptoms.
4. Valuable data on the health problems faced by children engaged in carpet weaving, has been provided by Matto *et al.* (1986), who studied 500 carpet weaving children and 450 school children (control) in J & K. Incidence of respiratory tract infection, headache, backache, and joint pains have all been significantly higher among carpet weavers. Apart from these, depending on the nature of toxic chemicals used in the dyeing process other ailments are potential.

5. The major diseases potential in cement handlers, are dermatitis and gastroduodenal ulcers. Conjunctivitis is also a potentiality. An unpublished study of Central Labour Institute, Bombay, has recorded in 85 workers, an incidence of 32 per cent of chest pain cases, 21 per cent of cough cases, 7 per cent of epigastric and stomach disorder cases and 7 per cent of dermatitis cases. The chest pain and cough cases did not, however, show any lowering in lung functions.
6. In tanning units, because of the wet and slippery surface prevailing in the work areas, accidents are likely. In particular, falls into the vats and tanning pits, are possible and may prove to be fatal. If the tanning pits are not cleaned frequently, emanation of hydrogen sulphide will pose a threat to life. Many of the chemicals used in tanning may cause dermatitis, due to skin contact. In a study carried out in Kanpur in 1973, out of 2,010 workers studied, 64 were dermatitis cases. In chrome tanning, chrome ulceration on the hands, and occasionally perforation of nasal septum are potential threats. However, the above 1973 study at Kanpur detected an incidence of only 0.45 per cent of ulceration cases. A recent retrospective study on cancer mortality among leather tanners has noticed a slight numerical increase in deaths from cancer of the stomach, and a significant threefold excess mortality from cancer of the pancreas. The authors have concluded that '.... it seems likely that this excess might be related to exposure to chemicals in tanning units'.
7. A study in Ahmedabad found the incidence of accidents per thousand workers in building and construction industry as 141 which is 2.8 times the figure of 50.1 for the manufacturing industries. Among all the activities at the construction site, very high incidence of injury occurs among machine operators (86%), scaffolders (80%), white washers (67%), plastering operators (45%), plumbers (35%) and blacksmiths (33%). Another significant observation was that injury cases were more in multi-storeyed buildings, and the incidence rate went up along with the height of the building going up. According to another report, the incidence rate of fatal accidents per 1,000 men in steel construction was nearly 7 times the figure of 0.14 for the manufacturing industries.

EXHIBIT 5

Extracts from National Policy on Child Labour (Health and Nutrition)

Health: Health is a State subject, and the programme of medical inspection of children has been assigned to the States. The progress among the various States is uneven. A few States have good programmes but many other States do not. In those States where there exists a school health service programme, many, and in some States even all, primary school going children in the rural areas have been covered under the scheme for regular examinations. But those children who do not join school because of being at work would obviously not be covered by such school health programmes (where they exist). The Ministry of Health and Family Welfare will address the State Governments, recommending that intensive medical inspection of children be taken up in those areas where child labour is prevalent. The State Governments will have to be persuaded to extend the coverage of the school health service programme to child labour. Since this is an area essentially under the State sector, a continuing dialogue, effort and persuasion with the State Governments will have to be maintained so that all children, irrespective of whether they are in primary school, or at work, are covered by regular health inspection and treatment/referral services. It should be possible to arrange for some health screening at NFE centres for child labour.

Nutrition: Department of Women and Child Development have an on-going programme for women and children i.e Integrated Child Development Services which are approved on the basis of proposals by the State Government and non-Governmental organizations. While it will not be possible to earmark funds specifically for child labour, proposals from State Governments/non-Governmental organizations and voluntary agencies in child labour areas will be funded on a priority basis and, if necessary, the rules could be relaxed to consider proposals from the organizations to be set up for taking up welfare measures for child labour also.

EXHIBIT 6

Extracts from National Policy on Child Labour (Project Based Plan of Action)

Project Based Plan of Action

It is known that there are specific sectors of employment where the incidence of child labour is high, such as:

1. The match industry in Sivakasi, Tamil Nadu.
2. The diamond polishing industry in Surat, Gujarat.
3. The precious stone polishing industry in Jaipur, Rajasthan.
4. The glass industry in Ferozabad, Uttar Pradesh.
5. The brassware industry in Moradabad, Uttar Pradesh.
6. The handmade carpet industry in Mirzapur-Bhadohi in Uttar Pradesh.
7. The lock-making industry in Aligarh, Uttar Pradesh.
8. The handmade carpet industry in Jammu and Kashmir.
9. The slate industry in Mankapur in Andhra Pradesh.

The child workers involved in the above mentioned sectors of employment and geographical areas deserve priority attention because either the employments and processes in which they work are prohibited under the Factories Act, or the Child Labour (Prohibition and Regulation) Act, 1986 or the work is such that it is likely to affect the child's well-being.

In each of the 10 "project areas", the strategy will be to evolve a package comprising the following elements:

1. Stepping up the enforcement of the Child Labour (Prohibition and Regulation) Act, the Factories Act and the Mines Act. If necessary, special enforcement staff will be created for the purpose.
2. Coverage of families of child labour under the income/employment generating programmes under the overall aegis of anti-poverty programmes.
3. Where there is a concentration of SC/ST families with child labour, a concentration of special component and Tribal sub-

plans by the State Governments in each project area.

4. Formal/non-formal education of ultimately all child labour engaged in hazardous employment, and of as many child labour as possible in non-hazardous employments. Also, a stepped-up programme of adult education (including non-formal education) of the parents of the working children.
5. Coordinating the activities of different Departments/Ministries of the Central Government and State Governments to benefit child labour.
6. Setting up of special schools for child workers together with provision of vocational education/training in such special schools, supplementary nutrition, a stipend to the children taken out from prohibited employments, and health care for all children attending at such special schools.

INDUSTRIALIZATION POLICY & HEALTH IN INDIA

INTRODUCTION

Low per-capita income, high unemployment and chronic poverty of a large majority of the population are the major problems of developing countries. Industrialization under the circumstances is resorted to for achieving higher income, create additional employment and earnings, particularly by reducing excessive pressure of population seeking employment mainly in agriculture and allied activities, making available various basic needs for mass consumption and so on and so forth.

Industrialisation by itself may not always generate directly a very high income, employment, earnings and production of various basic needs for the economy, but it will have tremendous amount of indirect effects in all of these. Industries produce many inputs for agriculture and allied activities, mining, infrastructures and services. Industries are again a major source of capital inputs necessary for capacity expansion. Directly it produces many durable and nondurable consumption goods.

Industries can also play the role of redistribution of income across various income groups and regions.

Industries require a number of urban facilities like housing, transport, marketing facility, water supply, power, medical and educational facilities etc. These things can most economically be

This case was prepared by Ranajit Dhar, Indian Institute of Management, Bangalore. It is intended as a basis for discussion rather than to illustrate either effective or ineffective handling of an administrative situation. Funds for its preparation were provided by a grant from WHO. Case II.3.

provided in an urban area with invariably high concentration of population. In a poor economy, it may not be possible to provide all these facilities adequately to every citizen of the urban area. During the initial few years of industrialization workers are often forced to live in slums in unhygienic conditions.

Industrialization also causes air and water pollution and various kinds of health hazards for the workers employed in various industries. It is possible, however, to control air and water pollution and various kinds of health hazards, but in a poor country the role of industry in generating additional production, income and earnings play a predominant role for economic reasons, and pollution and health hazards of various kinds generally tend to take a back seat.

Enterprise managers are naturally concerned about increasing production and productivity. Removal of health hazards of industrialization in a labour surplus economy may not add to productivity improvements, but it increases the cost of manufacturing. Management would, therefore, tend to ignore health hazards in such circumstances unless they are forced to do something about it.

The workers who are already suffering from malnutrition and have very substandard living conditions generally value getting any job irrespective of likely health hazards. They would, of course, expect the employers to compensate for any injury, death or disability resulting from their occupation.

Regarding health hazards of industries such as water and air pollution which concern the public at large, Government may make appropriate legislation for taking appropriate corrective actions. Even a Government sometimes faces the dilemma of a choice between cheaper variety of insecticides like DDT/BHC (to control Malaria and increase food production) and costlier insecticides which have less health hazards for the general masses compared to the cheaper varieties.

It appears, therefore, that while health hazards are a fact of life, the extent to which it can be controlled depends upon the level of development of the economy and how much the economy can bear these costs. Relatively more developed economies can afford to invest larger amounts in the control of various kinds of health hazards, while a less developed economy may find it difficult to do so.

Efforts are usually made in many developing countries to achieve, through appropriate policy of industrialization, income redistribu-

tion in favour of the poorer sections of the population. This is not an easy task unless there is a strong commitment of the nation and its Government to achieve this.

In a poor economy, particularly in an economy with a large number of population in relation to various resources, particularly land resources, income and wealth tend to be distributed in a highly skewed fashion. Unless vigorous institutional changes are resorted to, the people with larger control over income and wealth would dictate the pattern of manufacturing activity in an economy. Under the circumstances, luxury goods production can corner the meagre resources stifling the growth of basic needs items necessary for a common man. While this is generally the trend in most of the developing countries, it is not healthy for the long-term development of the economy.

Industrialization depends upon the size of the market for its products. Markets can be expanded within an economy and/or outside the country.

Only a few developing countries such as the Republic of Korea, Malaysia, Thailand, Indonesia etc. have so far been able to develop their export markets. Exports constitute 24% of GNP in Thailand to as high as 37% of GNP in the Republic of Korea, while the corresponding figure for India is only about 5.8%. India has been expanding its economy within the protected domestic market. If, under the circumstances, large number of people are not brought within the mainstream of the economy, the rate of growth of industry will be constrained by the rate at which the country is able to bring more number of people above the poverty level.

As a result of all these the developing countries will only be able to make a marginal dent on the problems of control of pollution and health hazards.

INDIAN SITUATION

India according to the 1981 census had a population of 685.2 million with an average density of 208.45 persons per sq.km, total area being 3.287 million sq.kms. Rural population constituted 76.7 per cent of the total or 525.4 million and the balance 23.3 per cent were urban. Growth rate of population has been increasing in each decade since the last four decades. The population growth rate during 1941-51 was 1.26% per annum, and 1.97% during 1951-61, 2.24% during

1961–71, and increased further to 2.256% during 1971–81. The occupational distribution of the population in 1981 is presented in Exhibit 1.

One redeeming feature is that the life expectancy at birth had been consistently increasing during the last four decades. It was only 32.45 for males and 31.66 for females in 1951, which increased to 41.89 for males and 40.55 for females in 1961, 46.4 for males and 44.7 for females in 1971 and 54.1 for males and 54.7 for females in 1980¹.

The Net National Product at factor cost and at current prices for the latest year 1986–87 was Rs. 2,29,010 crores (1 crore = 10 million)¹⁰. With the estimated mid-year population of 770 million, the per capita income works out at Rs. 2,974.2.

The industry-wise break-up of gross domestic product at current prices for 1986–87 is presented in Exhibit 2. It may be seen from the table that manufacturing constitute only 18.8 per cent of GDP of the economy, with registered factories 12.1 per cent and balance 6.7 per cent being the contribution of the non-registered manufacturing units.

The employment in the registered factories in Indian industries has been growing at 3.2% during 1951 through 1983–84, from a level of nearly 3 million in 1951 to about 8 million in 1983–84. The table in Exhibit 3 shows the break-ups of industrial employment for broad groups of industries. It may be seen from that table that in 1951 textiles were the biggest employers with nearly 40 per cent of total. Textiles continued to be the biggest employer in 1983–84 also but its share to the total went down to little over 20 per cent of total during that year. The second biggest employer in 1983–84 was Electrical and General Machinery manufacturing sector, followed by Basic Metals, Chemicals, Transport Equipment and Non-metallic Mineral products.

COMPONENTS OF INDIAN INDUSTRIALIZATION POLICY

The main components of Indian industrialization policies are summarized here. Further details are available in the publication by L.R. Kumar⁵.

INDUSTRIAL POLICY RESOLUTION, 1948

The main objective of this Resolution was to delimit the relative roles of the public and the private sectors in the process of development of

the Indian economy. As part of this policy resolution, sectors such as Arms & Ammunitions, Atomic Energy, and Railways will be exclusively under the control of the Central Government. The Government would also have the power to take over any industry vital for national defence.

In the case of the following sectors the Government (Central, State & Local Authorities) will have the exclusive responsibility for starting all new units, except where the Government feels it necessary to seek the co-operation of the private enterprises:

1. Coal;
2. Iron & Steel;
3. Aircraft Manufacture;
4. Shipbuilding;
5. Manufacture of Telephone, Telegraph and Wireless Apparatus except Radio Sets; and
6. Mineral Oils.

The existing undertakings in the above sectors were allowed to function for a period of ten years after which the position will be reviewed in the light of the prevailing circumstances.

The Government also promulgated a measure for the State Control of generation and distribution of electric power.

The rest of the industrial field was left open to private enterprise though it was made clear that the State would also progressively participate in these fields. In fact Government was involved in many multipurpose river valley projects, fertilizer production, essential drugs etc.

Legislative backing for implementing the Industrial Policy Resolution, 1948 was sought to be achieved through a Bill in 1949. This Bill was finally passed as an Act (IDR), 1951. This Act provides the main statutory instrument for achieving the objective of directing resources as per the plan priorities. The Act applies to all undertakings manufacturing certain items as specified in the First Schedule of this Act. A licence is required for establishing a new unit, production of a new article, substantial capacity expansions, and changing locations.

INDUSTRIES POLICY RESOLUTION, 1956

The Industrial Policy Resolution, 1948 required a review as the Government later adopted 'Socialistic Pattern of Society' as the goal. The emphasis was given to the

- i) development of heavy machine making industries,
- ii) to prevent private monopolies and concentration of economic power,
- iii) growth of small-scale and cottage industries throughout the country and
- iv) to expand public sectors.

The resolution classified the industries into three groups:

- i. Industries, the future development of which will be the exclusive responsibility of the State;
- ii. Industries, which will be progressively State-owned. New undertakings will mostly be started by the State, and the private sectors will play a supplementary role.
- iii. All remaining industries which are mostly consumer goods items will be left to be developed by the private sectors.

THE MONOPOLIES & RESTRICTIVE TRADE PRACTICES ACT, 1969

According to this Act all large-scale undertakings by themselves or in interconnection with other undertakings having assets not less than Rs. 20 crores (raised to Rs. 100 crores in 1985) will be eligible to participate in and contribute to the establishment of industries in the list included in Appendix I to the Press Note of February 2, 1973 (commonly known as Appendix I industries) provided that the item is not reserved for the public sector or for the small-scale sector.

They will ordinarily be excluded from other industries except when production is predominantly for exports.

THE FOREIGN EXCHANGE REGULATION ACT, 1973

Foreign investment is viewed as a vehicle for transfer of technology. The normal ceiling for foreign investment is 40% of total equity capital. A higher percentage can be considered in priority industries if the technology is sophisticated and not available in the country or if the venture is largely export-oriented. For 100 per cent export-

oriented units even 100% of foreign equity may be considered.

Foreign share capital should be contributed in cash without any tied imports of machinery and equipment or payment for know-how, trade marks etc.

Payment of technology and know-how can be made either in the form of annual royalty or as lump sum or both. The rate of royalty is normally limited to 5% of sales turnover and for a period of 5 years only.

INDUSTRIAL DISPERSAL

This is achieved through i) promotion of small-scale industries, ii) backward area development, and iii) development of growth centres.

Small-scale units include industries with an upper limit of investment in plant and machinery of Rs. 35 lakhs (1 lakh = 0.1 million), all Ancillary units and Service-oriented Small-scale Establishments.

Various types of incentives are provided for the development of dispersal of these units. They include i) reservation of certain types of industries for exclusive development in the small-scale sector only, ii) exclusive government purchase of certain specified items from small-scale sector only, iii) price preference to small-scale items over those produced in large and medium units, v) credit facilities etc.

The Government of India have notified certain districts as backward and also notified certain districts which do not have any large-scale or medium-scale units as 'no industry districts'. For purpose of providing Central assistance both these groups of districts have been subdivided into three categories as follows based on the extent of their backwardness:

Category A: This group as of now comprises 93 industry districts and 38 special regions. They are eligible for subsidy upto 25% of investment with a ceiling of Rs. 25 lakhs.

Category B: This group includes all districts currently eligible for central subsidy less all districts covered under Category A. They are entitled for investment subsidy of 15% only with a ceiling of Rs. 15 lakhs.

Category C: This group includes all the 246 concessional finance districts less those already included in either A or B category as above. They are entitled for a subsidy of 10% of investment with a

ceiling of Rs. 10 lakhs.

For promoting development of backward areas in an effective manner the focus is now on development of growth centres.

To begin with at least 100 such growth centres would be developed throughout the country over the next five years. Each such growth centre would be provided with a fund of Rs. 25–30 crores in order to create the required infrastructural facilities of high order. It is planned to cover all the backward districts with a growth centre during the next 10 to 15 years. The ultimate objective is to have a growth centre for all the 430–odd districts of the country.

IMPACT OF INDUSTRIALIZATION POLICY ON HEALTH

It is possible to tackle the problems of health hazards of industrialization through programmes on: i) Education and awareness of managers and workers, ii) investment in better machines causing less health hazards, iii) investment in various protection measures like using masks, ear plugs etc., iv) providing necessary medical facilities, etc. Certain components of industrialization policies may aggravate the problem of health hazards. Three such major policy issues will be highlighted here. They are:

1. Structure and composition of industrial production,
2. Policy on export promotions, and
3. Industrial dispersal.

While a certain amount of occupational health hazards are unavoidable, in developing countries the poor workers who are already suffering from all poverty-related diseases namely, malnutrition, living in unhygienic conditions, ignorance etc., the impact of occupational health hazards is likely to be more serious. Under the circumstances one of the major aims of industrialization should be to make available all basic needs on a top priority basis. The study by Dandekar⁷ indicates the failure of Indian Planning in this respect. His findings on availability of nutrition is discussed below.

The estimated population in 1985 was around 780 million while the food production was around 150 million metric tones. After allowing for seed, feed and wastage of about 12.5%, the per capita per day availability works out at 480 gms. At the rate of 3.4 calories per gram, this comes to 1,632 calories per capita per day.

As regards the other food items, the net availability of edible oil including hydrogenated oil in 1984–85 was 18.35 gms per capita per day. This figure multiplied by 9 calories per gram works out to a supply of 165 calories per day.

The net availability of sugar and raw sugar is about 66 gms per capita per day. At the rate of 3.9 calories per gram, this would mean a supply of 257 calories per capita per day.

The per capita availability of total calories works out as 2,054 per day. This is less than the requirement of recommended supply of 2,300 calories per capita per day. On an average the shortage is about 10.7%.

Considering the inequality in the distribution of purchasing power of the population, based on the National Sample Survey Data on Consumer Expenditure, it can be inferred that the per capita availability of calories for the poorer sections of the people will be much less. The NSS data indicate that the top 20% of the population share 40% of the consumer expenditure, bottom 30% of the population share 15% and the middle 50% of the population share 45% of the expenditure.

However, it may also be mentioned that the inequality in the consumption of food grains may not be as bad as the inequality in the aggregate consumer expenditure. It is not possible to give an exact idea about the inequality in the distribution of consumer expenditure, but on an average it can be definitely stated that the average calorie intake per capita per day for the poorer sections of the people is going to be much less than 2,054 per day, which is an average for the entire population.

The situation, compared to foodgrains, is much worse for other basic need items such as clothing, housing, health, education and recreational facilities etc. The country has not been able to provide all these facilities adequately for the poorer sections of the people.

Thus the poorer sections of the population, which constitute nearly 50% of the population of the country, are not only suffering from all poverty-related diseases such as malnutrition, ignorance etc., but are also sharing the burden of health costs in the form of air and water pollution, various occupational health hazards, abuses of child labour, women labour etc.

These people are fighting for sheer existence and any cry for better quality of life for them appears to be a far cry.

There is a recent trend of transferring health hazards of developed countries to developing countries. The developing countries, in their anxiety to increase export earnings, tend to promote Chemicals and other hazardous industries in their own countries mainly for exports. Exhibit 5 has provided the data on Indian exports. These data clearly show a tremendous increase in exports of Chemicals. The Chemical export which was only Rs. 29.36 crores has increased to Rs. 370.59 crores in 1984–85. It is believed that further negotiations are on to set up new fertilizer units exclusively for exports.

There is also a tendency to export primary products like fish, fruits etc. at the cost of nutrition of the common man. Appropriate policy should be evolved to limit such exports.

In a vast country like India, dispersal of industries is necessary for reducing regional disparity in development. However, this policy leads to creation of health hazards in newly developing areas. To the extent such policies of industrial dispersal is unavoidable, advance action should be taken to tackle likely health hazards for which preparation of a national health policy with breakdowns at the regional levels will be very useful.

OCCUPATIONAL HEALTH HAZARDS AND SAFETY

The study by Kazantzis and McDonald⁸ has provided information on the prevalence of various types of occupational diseases. Some of the findings of this study are set out below.

It is observed that one of the most common occupational diseases are the diseases of the respiratory system. The respiratory tract and skin are readily accessible to noxious factors in the environment. A number of toxic substances like carbon monoxide, cyanide etc. are absorbed through the respiratory tract. The respiratory irritants like chlorine, ammonia, nitrogen and sulphur and several heavy metal components are present in gases and fumes encountered in mining, agriculture, chemical and metal industries. Their effects are direct and proportional to their toxicity and the amounts liberated.

In addition, there are a number of chemicals of organic origin such as formaldehyde, platinum salts, acid anhydrides that appear to be especially potent causes of occupational asthma. This problem is encountered in the manufacture and use of Foam Products, Paints, Plastics, Rexine, in soldering and any medical laboratory.

Workers in heavy industries like Mines, Quarrying, Foundries,

Textile Mills, Building Products factories are exposed to dust, irritant gases and fumes and to adverse conditions of temperature and humidity. Most of them also smoke cigarettes and some of them very heavily. Chronic Bronchitis and Emphysema are highly prevalent amongst such workers.

Fibrosis of the lung are caused due to the existence of various mineral dust. One classical example is Silicosis. This is serious and sometimes causes fatal diseases of miners, quarry workers, stone cutters, pottery workers etc. The risk of the disease is directly related to dust concentration. The recent report by Dr J.C. McDonald and others⁹ has indicated that out of a cohort of 1,321 South Dakota Gold Miners employed for 20 years or more, 37 died from silicosis, and 35 from silico-tuberculosis. The other diseases of this variety are coal miners' pneumoconiosis, asbestosis etc.

There are various other types of diseases related to occupation, namely, diseases of the circulatory system, digestive system, urinary tracts, nervous system and sense organs (hearing loss, CNS effects), blood diseases, reproductive effects etc.

IMPLEMENTATION OF HEALTH HAZARDS PREVENTION IN INDIA

In the second Citizen's Report¹² of the Centre for Science and Environment, New Delhi, on the study of India's Environment, 1984-85, various findings of occupational health hazards in India have been summarized.

It will be useful here to mention some of the findings of the study. These findings are summarized below.

Silicosis was reported in India in the Kolar Gold Mines as early as in 1947 and subsequently in various other mines and industries.

The slate pencil factories of Mandsaur in Madhya Pradesh are a shocking case in point. It was found that there was hardly a man alive over 40 years of age.

According to the observations of a study of 605 Mandsaur workers in six units, conducted by the National Institute of Occupational Health (NIOH) in 1981, the dust was 50 to 55% silica, was breathed in directly and the first symptom of silicosis after six months were cough and cold, followed by chest pain etc. This study found that 55% of the workers had silicosis and 18% had advanced form of the disease. A

local doctor estimates that about 150 persons die every year and during the last 25 years at least 3,500 people have died.

The Centre for Education and Documentation (CED) set up in Bombay in 1983, states that the widespread and as yet not reported instances of asbestosis is best summed up by Dr. S.R. Kamat of KBM Hospital, Bombay, who notes, "There is no doubt that one-third of the workers in asbestos factories are suffering from asbestosis."

The Central Labour Institute (CLI) in Bombay has found that 38 out of 850 workers in an Asbestos Cement factory in Faridabad are suffering from this disease. A similar study by NIOH of 850 workers of an Asbestos Cement company in Bombay revealed that 22% of the workers suffered from an advanced state of this disease.

Textiles and other fibre-based industries employ 1.05 million people while cotton mills alone account for 0.8 million. Textile workers who have been employed for more than 20 years are affected by Byssinosis.

The KBM and MGM hospitals and CLI in Bombay studied 3 cotton mills during 1970-75. The overall incidence of byssinosis was observed to be 12%, the rate being higher in the carding section. Byssinosis has been reported in Cotton Textile Mills in Ahmedabad, Bombay, Delhi, Kanpur, Madras, Madurai and Kanpur with the incidence varying from 6% to 20%.

A recent epidemiological study¹³ conducted by NIOH (by Dr. J.R. Parikh and others) on the prevalence of Byssinosis in Textile Mills of Ahmedabad observed that the mean prevalence of byssinosis in the blow section was 29.62%, while in the card section it was 37.83%. This study is based on a sample of 929 workers from the spinning department of three textile mills of Ahmedabad.

Pneumoconiosis better known as the source of "black lungs" are associated with the workers who are long exposed to coal dust. This disease not only make the workers incapable of hard work but also can be fatal.

A random survey by the Central Mines Research Station at Dhanbad revealed that 8% of the miners suffer from this disease. This percentage seems to be an underestimate because even in the United States the percentage is higher.

According to a sample survey by Dr. M.K. Sinha, Deputy Director of the Central Mining Research Station, Dhanbad, over one million

workers are exposed to silicosis as well. Of a group of 150 workers studied, 10% had advanced form of the disease. If the workers work six hours a day in drilling stones, he dies in just 5 years. He further points out, "If you take the man away from the job, he may survive but he will no longer be able to work."

The growth of Indian Chemical Industries during the three decades of 1950–1980 has been phenomenal. According to Dr. C.R. Krishnamurthy, former director, Industrial Toxicology Research Centre in Lucknow, adverse health affects associated with exposure to chemicals in the work environment have been well documented in India. But it is not clear how far the background of health situation of the workers' living conditions as they exist in unhygienic surroundings exacerbates the toxic effects triggered by chemicals in the work environment.

Chemical Units manufacturing insecticides is of particular concern for creating occupational health hazards. NIOH, which studied the same industry during 1978–79, confirmed that "toxicity symptoms such as headache, vomiting, nausea, stomach ache, skin and eye irritation, respiratory complaints manifested themselves either singly or in combination in majority (73%) of exposed subjects".

The CLI studied 360 workers in a Lead-acid Storage Battery Unit in Bombay and found that around 9% suffer from lead poisoning while two-thirds are exposed to airborne lead in excess of threshold value. Those affected complain of loss of muscle power, colic and exhaustion.

In the Indian conditions a number of legislations like the Factories Act 1948,² the Workmen's Compensation Act 1923³, the Employees' State Insurance Act 1948⁴ and the various other associated Acts like Miners Act 1951, Plantation Act 1951, Indian Dock Labour Act 1934 etc. with provisions similar to the Factories Act have been in existence. The Factories Act has been recently strengthened in view of the occurrence of the Bhopal Tragedy on December 3, 1984.

Gladwin¹⁴ has provided a very good analysis of the Bhopal tragedy. It will be useful here to summarise his findings. The root cause of the Bhopal tragedy was the leakage of forty tons of highly toxic, vaporized methyl isocyanate (MIC) escaped from a storage tank at a pesticide plant 50.9% owned by Union Carbide. The gas cloud enveloped half the city, killing more than 2,000 people (by some estimates more than 5,000) and injuring as many as 2,00,000, mainly causing lung and eye damage. This 'worst industrial accident in history, stunned both

India and the world, and created widespread 'Chemophobia'. This called for an international code of conduct and safety assistance programmes for the developing countries. Gladwin has provided the analysis of both corporate and Government failures.

Gladwin listed the following aspects of corporate failures:

1. Failure to Anticipate
2. Failure to Equip
3. Failure to Inform
4. Failure to Control, and
5. Failure to Comply.

One member of the Union Carbide team that had performed the 1982 operational safety survey at Bhopal admitted to the Press that the safety systems of the Indian plan had not been "upto American standards....."

The Government failures listed are:

1. Failure to Anticipate
2. Failure to Equip
3. Failure to Inform, and
4. Failure to Control.

It is not clear when the last in-depth Government inspection of the Bhopal Plant took place. The Chief Inspector of Factories, however, stands accused of having renewed the Union Carbide factory licence annually without considering earlier safety lapses. The Secretary of the Indian National Trade Union Congress told the Press that inspections of the plant by local officials were rather irregular and superficial, with the consequence that "complicity of Government officers" in the tragedy is a distinct possibility.

In addition to corporate and Government failures it can also be mentioned here that there was no evidence of any kind of trade union pressure on the management to take advance precautionary measures in this matter. This shows that the trade union leaders lacked proper understanding about the seriousness of industrial health hazards and safety.

The Factories Act as amended by Act 20 of 1987 included a new chapter viz. Chapter 4A with provisions relating to hazardous

processes. This chapter includes items such as,

- I) Constitution of Site Appraisal Committees,
- II) Compulsory disclosure of information by occupier,
- III) Specific responsibility of the occupier in relation to hazardous processes. The power of Central Government to appoint Enquiry Committees, Emergency Standards,
- IV) Permissible limits of exposure of chemical and toxic substances.

The maximum permissible threshold exposure of chemical and toxic substances in manufacturing processes (whether hazardous or otherwise) in any factory shall be of type value indicated in the II Schedule of the Act.

In addition in Chapter 9, under special provisions (stanza 89) a list of 29 diseases have been given as notified diseases under the III Schedule of the Act. According to this III Schedule, Manager of the Factory shall send their notice thereof to such authorities and in such form and within such time as may be prescribed.

The Central Government may by notification in the Official Gazette add or alter the III Schedule. Any such condition or alteration usually have effect as if it had been made by this Act.

In Chapter 10 under Penalties and Procedures, the various penalties for any violation of the provisions of this Act, more specific provisions relating to the quantum of penalties have been specified as part of the amendment of this Act.

As provided in stanza 111(a), every worker shall have the right to:

- I. Obtain from the occupier information relating to workers' health and safety at work.
- II. Get trained within the factory wherever possible or to get himself sponsored by the occupier for getting trained at a Training Centre or Institute duly approved by the Chief Inspector where training is imparted for workers' health and safety at work.
- III. Represent to the Inspector directly or through his representative in the matter of inadequate provision for protection of his health or safety in the factory.

Another important Act is Employees' State Insurance Act. This Act

is designed to accomplish the task of protecting employees as defined in the Act against the sickness, maternity, disablement and death due to employment, injury and to provide medical care to insured persons and progressively to their families. The scheme initially covers employees of non-seasonal power using factories employing 20 or more workers. There is also built-in provision to extend this act to other establishments.

This Act serves as a health insurance and as a result the funds come from the contributions from employers, employees and workers. All persons drawing the wage not exceeding Rs. 1,600/- per month excluding overtime are covered under this Act.

The Third important Act is the Workmen's Compensation Act, 1923. The role of this Act is in the form of providing assistance in the form of monetary compensation for fatal as well as non-fatal injuries including occupational diseases when they are not covered by the ESI Act. The payment of compensation under this Act has been made a liability of the employer.

CONTROL OF POLLUTION

Royston⁶ in his book, *Pollution Prevention Pays* has mentioned that industrialised countries spend on an average 1% of their GNP for control of air pollution, water pollution and pollution by solid wastes. Many studies in industrialised countries indicate that the cost of the damage resulting through pollution runs between 1% and 3% of the GNP. These figures include damages to health, land, buildings and tourism.

Many of the pollution factors arise due to sheer waste of resources. For example, we know that overall efficiency of energy used in most industrialised countries is less than 40%. Over half the energy used is dissipated as waste heat which affects the atmosphere and the climate.

The cause of air and water pollution in terms of agriculture, fisheries and forestry is extremely high. The study in the USA has indicated that damage done to the vegetation by air pollution alone can be estimated around \$120 million per year.

Pollution, particularly air pollution causes material damages to buildings, paint work, unprotected steel works and public monuments as well as soiling cloth, windows etc., and has been making life dirtier and less pleasant.

A Canadian study reveals that damage and repairs to industrial and commercial properties, various categories of general corrosion and cleaning it, works out to about \$49 (Canadian) per capita per annum.

Loss of amenities embraces all forms of financial and non-financial loss such as disturbances from noise, less recreational facilities and the lower quality of life. The financial cost includes such factors as the cost of bringing clean water over distant places and the more extensive treatment required by water supplies from polluted sources. The City Dwellers tend to move out of polluted areas to live and for recreation. This involves an additional expenditure on transportation infrastructure. The related effect is the loss of property values in polluted areas. In the context of developing countries, a polluted environment stands in the way of attracting tourists from industrialised countries.

The damage caused by noise pollution is difficult to measure, but the very fact that people tend to move away from noisy areas such as surrounding airports, railway lines, roads etc., the differentials in house price can be treated as an indicator.

Apart from damages to agriculture, forestry etc., the most telling effects are on health and well being of the people in general. Many of the diseases prevalent today could be attributed at least in part to environmental pollution although this discovery is a relatively recent phenomenon. A study in the U.K. puts the national health cost of air pollution in 1970 at 640 million pounds. The majority of these costs have been attributed to Bronchitis.

IMPLEMENTATION OF POLLUTION CONTROL IN INDIA

Pollution control is already included as part of industrial licensing norms in the country.

It is necessary for the entrepreneurs while planning an industrial project to anticipate such fall-outs of industries and decide on the appropriate technology and resetting.

Entrepreneurs should make a preliminary environmental proposal before deciding the location of the project. A comprehensive study should be undertaken for all industrial projects falling in the following broad categories.

- I. Producing or handling materials of hazardous nature.
- II. Discharging dangerous or obnoxious effluents and wastes

likely to have an adverse environmental effect on air, water and soil.

- III. Located in sensitive areas such as highly industrialised or urbanised areas and those having cultural, historical or places of national importance.

The Water (Prevention and Control of Pollution) Act, 1974 was passed by the Parliament and was subsequently adopted by majority of the States in India.

There are Central and State Boards for Prevention and Control of Water Pollution. In such places where the Boards for Prevention and Control of Water Pollution have not been specifically established, the functions assigned to those Boards will be looked after by the State Health Board.

Under The Provisions of the Act:

- a) No person shall knowingly cause or permit any poisonous, noxious or polluting matter determined in accordance with such standards as may be laid down by the State Board to enter (whether directly or indirectly) into any stream or well; or,
- b) No person shall knowingly cause or permit to enter into any stream or any other matter which tend, either directly or in combination with similar matters, to impede the proper flow of the water or the stream in a manner leading or likely to add a substantial aggravation to pollution due to other causes or of its consequences.

Then the Water (Prevention & Control of Pollution) Cess Act, 1977 was enacted for the levy and collection of cess on water consumed by the entrepreneurs engaged in certain industries and by local authorities with a view to endorsing the provisions of the Water (Prevention and Control of Pollution) Act.

Air (Prevention and Control of Pollution) Act, 1981 provides for the prevention, control and abatement of air pollution and for the establishment of Boards to carry out the purposes mentioned above. For the purposes of this Act, air pollution means any solid, liquid or gaseous substance present in the atmosphere in such concentration as may or tend to be injurious to human beings or other living creatures or plants or property or environment.

The Air pollution is caused by industrial effluents, transport emissions, meteorological conditions, improper land use etc. It also arises from various other sources such as the domestic consumption of low grade fuel, fine dust from deserts, open dry fields, unpaved streets, human insanitary activities etc.

Uncontrolled and excessive air pollution may hinder development and retard productivity. Over the past three decades, with the steady development of industries in the country, the problem of air pollution has assumed serious proportions especially in the areas of high concentration of industries, particularly chemical industries.

The Central Board for Prevention and Control of Water Pollution exercises the power and functions of the Central Board for the Prevention and Control of Air Pollution. So far as the cases of State Boards, the State Governments have been given powers to declare air pollution controlled areas, to give instructions for ensuring standards for emission from automobiles and restrictions of operations of certain industrial plants. Persons carrying on industrial activity are required not to allow emission of air pollution in excess of the standards laid down by the State Boards.

The Environmental (Protection) Act received assent of the President on 23rd May 1986. Subject to the provisions of this Act, the Central Government shall have the power to take measures for protecting and improving the quality of environment and preventing, controlling and abating environmental pollution. Such measures include co-ordinating actions by the State Governments, laying down standards for emission and discharge of environmental pollution through various sources, restriction of areas in which any industries, operations or processes shall not be carried out, laying down procedures and safeguards for the prevention of accidents, handling of hazardous substances, examination of such manufacturing processes, materials and substances as are likely to cause environmental pollution and matters connected therewith.

The Rules formulated by the Government for the Environment Act were published on 19th November 1986. These rules provide for the directions for administering the Act, the procedures for prohibition and restrictions on hazardous industries and carrying on process and operations in different areas, the procedures for taking samples, functions of environment laboratories, standards for effluents in respect of selected industries etc.

Entrepreneurs may seek advise of the State Government authorities on the various steps to be taken to conform to the pollution control measures at the initial stage of planning of the project. An important condition attached while granting a Letter of Intent is as follows:

“Government to prevent air, water and soil pollution. Further, such anti-pollution measures to be installed should conform to the effluent and emission standards prescribed by the State in which the factory is located.”

Government has issued two Press Notes in June and December 1984 stipulating that Environment Clearance to the satisfaction of the Government should be obtained before the Letters of Intents are converted into Industrial Licences. Entrepreneurs will have to file suitable certificates to the State authorities to this effect while applying for the conversion of Letter of Intent into Industrial Licences.

Government has identified the following 20 as high polluting industries.

- i) Primary metallurgical producing industries viz. Zinc, Lead, Copper, Aluminium and Steel;
- ii) Pesticides/Insecticides
- iii) Fertilizers
- iv) Dyes
- v) Rayon
- vi) Foundry
- vii) Storage Batteries (Lead acid type)
- viii) Plastics
- ix) Cement
- x) Fermentation Industry
- xi) Paper, Pulp and Newsprint
- xii) Refineries
- xiii) Paints
- xiv) Leather/Tanning
- xv) Sodium Potassium Cyanide
- xvi) Basic Drugs

- xvii) Acids/Alkalis
- xviii) Rubber/Synthetic
- xix) Asbestos
- xx) Electro-plating Industry

In the case of a project falling in any of the above groups, the following additional conditions are stipulated.

- i) The State Director of Industries confirms that the site of the project has been approved from the environmental angle by the competent State authority.
- ii) The entrepreneur commits both to the State Government and the Central Government that he will install the appropriate equipments and implement the prescribed measures for the prevention and control of pollution.
- iii) The concerned State Pollution Control Board has certified that the proposal meets with the environmental requirements and that the equipment installed or proposed to be installed are adequate and appropriate to the requirements.

Industries involved in hazardous processes are subject to the following condition:

“Adequate steps shall be taken to the satisfaction of the Government in regard to process hazards for ensuring safety in plant. Before going into production, the adequacy of steps taken in this regard should be established to the satisfaction of appropriate Government authorities.”

It may be useful here to mention certain instances based on the study by the Centre for Science and Environment¹² to find out how conscientious is Indian Industry about pollution control.

Speaking at the Indian Institute of Technology in Madras Dr. T.N. Khoshoo, Secretary to the Department of Environment, commented that whenever there was a power cut, factories first shut down their effluent treatment plants. A spokesperson of the Federation of Indian Chamber of Commerce and Industry (FICCI) admits that industrial houses think that pollution control as far as they are concerned, is a waste of money although FICCI has announced an annual award to industries with good records in pollution control.

The Government is providing a number of financial incentives. A depreciation of 30% is allowed on devices and systems for minimising environmental pollution. An investment allowance at the rate of 35% has been allowed for any new machinery or plant being used to assist in the control of pollution or protection of environment. There are also concessional duties on imported equipments for pollution control. The State Financial institutions have included the installation of effluent treatment facilities under the soft loan scheme, under which loans upto Rs. 4 crores carry a 11.5% rate of interest against the normal lending rate of 14%. These institutions also give high priority to financing projects to manufacture waste recycling and effluent treatment plants.

Industry feels that these concessions are not adequate to absorb the expenditures involved and this type of expenditures are going to add to already high inflation. FICCI believes that an all-out programme for pollution control, which it estimates will demand an annual additional investment equivalent to 0.5% to 1% of GNP — between Rs. 750 crores and Rs. 1,500 crores — would lead to inflationary tendencies.

The Department of Environment is not convinced. Industry-specific minimal national standards (MINAS) are being prepared by the Central Board for the Prevention and Control of Water Pollution (CBPCWP). The studies conducted so far show that the annual burden of pollution control, which includes capital and operation costs, maintenance and repairs, exceeds 1% of annual turnover to control liquid effluents to the desired level of standards in only a few cases. Fertilizer and textile industries require 2% of annual turnover as annual burden. Industries producing pesticides, pharmaceuticals and dye and dye intermediates cross 3%. Molasses-based alcohol distilleries, which have an extremely high pollutant load, need the maximum. Even with 5% of annual turnover the pollution control system brings the effluent quality only to the first desired level. "It is generally agreed that pollution from most of the industries may be contained to the desired level if 3% of annual turnover is put down towards water pollution control," says Dr. Khoshoo. Dr. Nilay Chaudhury of the CBPCWP adds that industries can pass this cost on to the consumer.

It is known that more than three-fourth of the industrial production is generated from within 12 cities [1984–85]. While Assam in the North-East and Himachal in the North-West, have to control not

more than 20 polluting industries each, Maharashtra and Gujarat are required to control no less than 400 to 600 industries each.

A survey of polluting industries was conducted by CBPCWP in various States except Maharashtra, Tamil Nadu, Orissa and five North-Eastern States. There are about 2,700 large and medium industries and out of these 1,700 are serious water polluters. Out of 1700 surveyed some 353 have commissioned industrial waste water plants, 174 have plants under construction and 190 are planning them. Thus only 717 units have treatment facilities. At this pace it could take two decades before pollution from large and medium industries is contained. The total number of polluting industries in India (1984-85) will be between 2,500 and 3,000. This has however, proved to be a gross underestimate. In March 1985 the Minister of State for Environment Mr. Bir Sain told the Rajya Sabha that there were about 4,000 polluting industries in the country, and only about 200 had installed affluent treatment facilities, and altogether 37 industries in various States have been directed to close down for violation of anti-pollution laws.

Meanwhile there are few attempts to control pollution from the small-scale sector. While 70% of the volume of industrial wastes is contributed by large and medium industries, 30% comes from small and cottage sector units on which there are few controls.

But it should still be easy to rapidly reduce pollution from industrial sources. Only a few industries generate most of the pollution. In Hyderabad, for instance, 13 out of 133 units generate more than 90% of the industrial waste water. In Delhi, control of 16 units would cover more than 95% of the industrial wastes.

Unfortunately, the Government has been lax in implementing its own rules and regulations. The Central Government has issued an executive order under which the Central Industrial Licensing Committee is to allow the conversion of the letter of intent into an industrial licence if an entrepreneur obtains a no objection certificate from the State Pollution Control Board. But according to Chaudhury, "majority of the States are not practising this procedure," nor does the licensing committee check the fulfilment of the no objection certificate requirements with the State Pollution Boards. Even in those States where these certificates are given, six-monthly progress reports are filed by the industrial units with the Directorate General of Technical Development and not the State Pollution Control Board.

Chaudhury fears that unless these administrative procedures are seriously enforced, new industries will add to existing pollution. There is a strong belief that States disregard pollution control specially in the case of industries being set up in the so-called backward areas. The argument is that these industries create employment. State Governments are also afraid that if they implement pollution control laws too harshly, industries could start moving to States which do not.

Prosecutions under the law have also been very few. The Water Act was passed in 1974 but the first prosecution took place in Rajasthan in 1983, when a manager of a paper mill was sentenced to two years' imprisonment and a fine of Rs. 2000/-. The proprietors of the mill were left untouched.

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EXHIBIT 1

Occupational Distribution of Population, 1981

<i>Occupational Category</i>	<i>Population (Million)</i>	<i>% to total population</i>
<hr/>		
1. Total main workers	222.5	32.5
1.1 Cultivators	92.6	13.6
1.2 Agricultural Labourers	55.4	8.1
1.3 Household Industry	7.7	1.1
1.4 Other workers	66.8	9.7
2. Marginal workers	22.1	3.2
3. Non-workers	420.6	61.4
4. Unaccounted	20.0	2.9
 Total ..	 685.2	 100.0

Source : [1], p.29

EXHIBIT 2

**Gross Domestic Product, 1986–87
(at current prices at factor cost)
(in Rs. Crores.)**

<i>Industry Group</i>	<i>Gross domestic Product.</i>	<i>% to Total</i>
1. Agriculture & Allied Activities	81,646	31.4
2. Mining & Quarrying	7,755	3.0
3. Manufacturing	49,124	18.8
3.1 Registered	31,486	12.1
3.2 Unregistered	17,638	6.7
4. Electricity, Gas and Water Supply	5,843	2.2
5. Construction	14,709	5.6
6. Trade, Transport and other services	101,603	39.0
Total ..	260,680	100.0

Source : [11], p.37

EXHIBIT 3

**Employment in Registered Factories, 1951 & 1983-84
(in thousand numbers)**

<i>Industry Group</i>	<i>1951</i>	<i>1983-84</i>
1. Textiles	1,134	1,653
2. Chemicals	74	516
3. Non-metallic Mineral products including Cement	110	435
4. Basic Metals	95	639
5. Electrical & General Machinery	108	794
6. Transport Equipment	195	504
7. All other industries	1,198	3,453
Total ..	2,914	7,994

Source : [1], p.347

EXHIBIT 4

Index of Industrial Production, 1984-85

(base : 1970=100)

<i>Industry Group</i>	<i>Weight</i>	<i>1984-85</i>
<hr/>		
1. Textiles	17.43	115.9
2. Chemicals	10.9	249.8
3. Non-metallic mineral products	3.33	193.8
4. Basic metals	8.84	170.3
5. Metal products	2.77	161.4
6. Machinery except electrical	5.55	266.7
7. Electrical machinery	5.3	192.6
8. Transport Equipment	7.39	178.9
9. All manufacturing	81.08	178.6

Source : [11], p.36

EXHIBIT 5

Principal Exports, 1970-71 & 1984-85, in Rs. Crores.

<i>Commodity</i>	<i>1970-71</i>	<i>1984-85</i>
<hr/>		
1. Agriculture & allied products	487.01	2829.54
2. Ores & minerals	146.82	487.36
3. Textiles	83.91	1270.71
4. Pearls & precious Stones	41.38	1093.06
5. Chemicals	29.36	370.59
6. Engg. goods	130.41	738.39

Source : [11], p.108

EXHIBIT 6

Macro-economic aggregates : Gross Domestic Product
& Expenditure, 1986-87 (at current prices in Rs. crores)

<i>Item</i>	<i>Amount</i>	<i>% to total exp. on GDP</i>
1. National Income	2,29,010	78.05
2. Net factor income from abroad	1,805	0.62
3. Net Domestic product at factor cost	2,30,815	78.67
4. Consumption of fixed capital	29,865	10.17
5. Indirect Taxes	42,789	14.58
6. Less Subsidies	10,061	3.42
7. Gross Domestic Product at Market prices	2,93,408	100.00
8. Government final consumption exp.	35,070	11.95
9. Private final consumption exp.	1,97,089	67.18
10. Gross Fixed Capital Formation	63,461	21.63
11. Change in stocks	7,947	2.7
12. Exports	16,954	5.77
13. Less Imports	22,464	7.65
14. Discrepancies	-4,649	-1.58
Expenditure on Gross Domestic Product	2,93,408	100.00

Source : [10], p.23

INDUSTRIALIZATION POLICY — HEALTH LINKAGE: Policy Options

A. POLICY OPTIONS ON OCCUPATIONAL HEALTH HAZARDS AND SAFETY

OCCUPATIONAL HEALTH ASSESSMENTS

One of the first steps to be taken by the countries of the region is to assess the occupational health situation using suitable indicators. Among the indicators suggested were:

- i. the average age of death of industrial workers;
- ii. morbidity due to service in industry;
- iii. mortality due to occupational diseases in industry;
- iv. case fatality rate due to accidents;
- v. active days lost as a result of absenteeism of sick workers.

THE ROLE OF LEGISLATION

Employers already burdened with high costs and limited markets, look upon the costs of prevention of health hazards and treatment of health problems as an untenable additional cost. Enterprise managers are naturally concerned about increasing production and productivity. Removal of health hazards of industrialization in a labour surplus economy may not add to productivity improvements,

The policy options presented here emerged from the deliberations on the cases in this module in "The Implications of Public Policy on Health Status and Quality of Life: A Symposium", Bangalore 18–26, October 1989, World Health Organization, SEARO, New Delhi.

but it increases the cost of manufacturing. Management would therefore tend to ignore health hazards in such circumstances unless they are forced to do something about it. Workers who in many cases are already suffering from undernutrition and have very sub-standard living conditions generally value getting any job, irrespective of the likely health hazards, and would expect employers to compensate them for any injury, death or disability resulting from their occupation.

But simply compelling employers to adopt suitable measures as legislated in the Factories Act, the Workmen's Compensation Act and the Employees State Insurance Act, would pose problems as shown in the case studies from India. The department of factories of every state is empowered to enforce these laws, but success depends on availability of information, organizational strength of the implementing body and the judiciary, as well as knowledge of the cost of occupational health hazards and safety measures.

These laws should be implemented not through the welfare system which would burden workers further through increased taxes, but rather through the industrial sector, making their concurrence with laws a prerequisite for obtaining an industrial licence.

The argument can be presented to employers that taking into consideration the health and welfare of their employees and their families can be a good investment rather than an extra burden. The Japanese example is often cited here as an illustration of how very high productivity (quality and quantity) can be combined with a complete package of health and welfare benefits for workers and their families during their lifetime up to death, including the provision of health services, education for children, housing, etc., provided for by the employer.

Ministries of health and industry should establish a regular dialogue with one another to discuss means of minimizing pollution through the siting of industries, their spatial planning, and the adoption of preventive and promotive measures to safeguard the health of people already located near factories. A coordinating body could be set up to oversee the plan and activities of different sectors.

PROVIDING INCENTIVES

Employers should be stimulated to reduce the incidence of ill health and accidents in their companies. Among the practical suggestions

which arose during the symposium was a yearly reduction of accident insurance premiums as an incentive to employers to reduce accidents.

Employers should be encouraged to set up company clinics and monitor the success of their management by the degree to which health status is maintained amongst at-risk employees. Various schemes could be introduced on an experimental basis in this area. Employers could create a fund in the form of a health premium per employee per unit of time, with health personnel being paid the remainder of the premium after all charges for treating employees have been deducted. In this way health personnel too would be rewarded on the basis of the number of people who do *not* fall ill.

There are difficulties in applying such a scheme across the board as illness needs to be defined in relation to the nature of the particular industry i.e., the health effects of bauxite industries are different from those associated with cement works.

WORKERS' ACTION

Trade unions and workers' associations have been instrumental in defining workers' rights and negotiating for wages and compensation. These organizations should now be encouraged to take relevant steps for the improvement of the health status of their members by working out innovative proposals for negotiation with employers.

DISSEMINATION OF KNOWLEDGE TO THE PEOPLE: DEMYSTIFICATION OF HEALTH

It is necessary to educate workers on the importance of safety and prevention measures. To many, health becomes a priority only when it interferes with their ability to work and earn a living.

In the struggle to protect the environment many people from a variety of backgrounds and education have understood the basic message of the environmentalists and have been persuaded to act to prevent environmental damage. An example can be seen in the famous "chipko" movement where women protected trees by virtually clasping them in their arms to prevent them from being felled by unscrupulous profiteers.

The health sector could learn from what has been accomplished by the environmental movement and launch a large scale public campaign on occupational health which would be simply stated in order to be understood by all. The whole process of dissemination of

knowledge and education regarding occupational health, pollution, and other aspects of industrial health and safety, should be launched worldwide in a systematic manner. WHO should take an active role in advocating and conducting a community strategy in this area.

B. POLICY OPTIONS ON CHILD LABOUR

THE EFFECTIVENESS OF LEGISLATION

Many countries in the region have recognized the adverse health and social effects on children who begin to work early and have enacted laws to protect them. In India, for example, where child labour dates back to 1881, the Constitution, in the Directive Principle of State Policy, states that no child below the age of fourteen years shall be employed to work in any factory or mine, or other hazardous employment. There are many Acts which specify different minimum ages at which children can start work, as well as required working hours, rest, and medical examinations. This indicates that the policy response to the problems of child labour is adequate.

There is, however, a big gap between these policy statements and their translation into action. Recent legislation in India prohibits the employment of children under fourteen in specified industries which are considered hazardous, yet a large number of children are still employed in these industries. It is clear, therefore, that the existing legislation does not adequately protect the rights of the child worker.

The main constraint is perhaps the lack of infrastructure to enforce legislation. The enforcement of child labour laws and regulations requires the establishment of special monitoring bodies with staff and services specially adapted to the total needs of children in the labour force. The second constraint arises from the unorganized nature of child labour in which little is officially known. It is very difficult to penetrate these home-based industries that escape formal supervision. At the same time the home-based industries are encouraged to flourish as an important means of generating income and employment, thereby reducing poverty, as well as encouraging initiative and creativity.

POVERTY — THE ROOT CAUSE

The alleviation of poverty is the principal long term strategy that would drastically diminish child labour since poverty appears to be the root cause. It is hoped that anti-poverty policies, educational policies,

health-for-all policies, nutritional policies and stepped up social services will all help this pernicious situation.

However a number of other measures need to be taken. Incentives or credit should be given to industries who employ minimal child labour and provide adequate prospects and safety measures for child workers. Special measures should be adopted to make it less attractive for families to send their children to work such as ensuring better income-generating activities for families who depend on the income from child labour. This would entail developing a profile of these families and educating the community. Social pressure would help to bring about greater change than simply relying on legislative and administrative measures.

DIFFERENT RESPONSES TO DIFFERENT NEEDS

The issue of child labour presents a complex picture since it entails such elements as employment in the formal or informal sector, and a variety of employment conditions. In order to deal with the different factors preempting passage into the work force, child labour needs to be viewed from several different perspectives and the problems responded to accordingly.

It was suggested that child labour can be divided into three categories:

- i. work in the informal sector;
- ii. work in the formal sector;
- iii. those working voluntarily.

There are different approaches to each of these categories. For working children still attending schools the schools could experiment by having special arrangements alongside the school curriculum for promoting income-generating activities that would help the child and his family, e.g., special crafts. Schools could be instrumental in helping children during school holidays, while others could organize educational classes in the work place for children working in the formal sector and voluntarily, at the same time ensuring that working children attain normal growth and development.

For children working in the informal sector the task is complicated as there are few, if any, indicators of where these children are, what they are doing and how many they are. Community-based organizations can be useful in reaching out to these children, finding

ways to help them earn a living and at the same time mature intellectually, socially and emotionally by encouraging income-generating activities, arranging for health care and informal schooling, and facilitating a dialogue to air concerns and find solutions.

C. SUGGESTION FOR FURTHER POLICY ANALYSIS

Work through the policy options in Sections A and B outlining the advantages and disadvantages of each. Decide which of these, or any other, you would adopt, and give reasons for your choice. Explain the anticipated difficulties in implementing these, and identify opposing views which might be expressed, and identify wherever possible, individual groups that would hold these opposing views. Outline, how you, as a policy maker, would defend the policy options you have chosen and explain the strategy you would use.

HEALTHY HOUSING: URBAN INDIA

INTRODUCTION

Shelter, along with food and clothing, is regarded as a basic need for human life. Studies on the impact of housing conditions on health have documented strong negative association of inadequate quantity and quality of water supply, sanitation facilities, space, ventilation etc., in the dwelling unit with the health of its inhabitants¹. Exhibit 1 lists a summary of major health problems associated with housing conditions based on a study by Stephens *et al*². The study suggests that the housing condition–health associations are of varying degree. It also warns that although the association between housing environmental factors and health are well documented, it is difficult to isolate causal relationships³. A range of socio-economic and environmental factors in urban slums and shanty towns of the developing world shows that while overall health indices of urban population may be better than those for the rural population, the poorest urban residents have more alarming health and nutritional conditions than their rural counterparts⁴ (also see Exhibit 2).

The World Health Organisation (WHO) in one of its recent publications, summarizes the health implications of housing in the following statements:

“Housing is intimately related to health. The structure, location, facilities, environment and uses of human shelter have a strong impact on the state of physical,

This case was prepared by Vinod K. Tewari, Indian Institute of Management, Bangalore. It is intended as a basis for discussion rather than to illustrate effective or ineffective handling of an administrative situation. Funds for its preparation were provided by a grant from WHO. Case III.1.

mental and social well-being. Poor housing conditions and uses may provide weak defences against death, disease and injury or even increase vulnerability to them. Adequate and appropriate housing conditions, on the other hand, not only protect people against health hazards but also help to promote robust physical health, economic productivity, psychological well-being and social vigour⁵.

A document prepared by United Nations Centre for Human Settlements (UNCHS-Habitat) for presentation at the 1988 Healthy Public Policy Conference at Adelaide has emphasized the role of housing in healthy living⁶. As observed in this document, though the relationship between housing and health is both intimate and complex, and is compounded by a myriad of factors such as poverty, nutrition, levels of income, literacy etc., which act together to defy the establishment of precise links, even so it can be said that poor housing is always associated with high mortality and morbidity rates. WHO, in a study to assess the extent of morbidity and mortality resulting from specific pathological conditions which are most obviously related to housing, estimated that 5 million deaths i.e., 10 per cent of all deaths worldwide, could be prevented if housing conditions everywhere in the world could meet safe standard levels. WHO also estimated that at least two to three million cases of permanent disability could be prevented through improved housing. The study also revealed that many deficiencies in housing adversely affect the mental health of the inhabitants⁷.

WHO publication on Health Principles of Housing outlines two sets of principles — one related to health needs and another related to health action — that need to be taken into consideration by governments, communities and families for developing housing policies, standards and programmes as also the external and internal housing environment⁸ (Exhibit 3).

BACKGROUND

The experience of India, like that of most developing countries, shows that the existing housing situation in the country leaves much to be desired both in terms of quantity as well as quality. The country has been facing acute shortage of housing, particularly in large cities, for the last several decades.

According to the estimates made by the National Building Organization of Government of India, the backlog of housing needs, today, in urban areas in the country is about 7 million⁹. The houseless population in the country was 126 thousand in 1961 which increased to 199 thousand in 1971 and 233 thousand in 1981. About 45 per cent households live in single room dwellings in a state of extreme overcrowding, about 6 persons to a room. A large number of such inhabitants live in slums in highly deficient living conditions. Out of the total urban population of about 160 million, in 1981, about 40 million (25 per cent) were estimated to be living in slums (see Exhibit 4 for data on slum population in selected cities).

The National Commission on Urbanisation in its report submitted to Government of India, in August 1988, has observed:

“The most visible and dehumanising manifestation of India’s urbanisation is the large number of squatters and shanty dwellers so ubiquitous in all our major cities. The causes of this distressing situation are deep-rooted in wide-ranging factors, from building regulations to economic growth policies”¹⁰.

In recent years, the expenditure on housing in the country has been about two to three per cent of its Gross National Product. In Japan, France and West Germany, it is between 6 and 8 per cent, and in the United States and Canada, it is 5 and 6 per cent. The public and private investment in housing as a percentage of total investment in the economy from the First Five Year Plan to the Sixth Plan is presented in Exhibit 5. The rate of growth of gross capital stock in housing (in terms of real value) has been about 1.5 to 1.6 per cent per annum¹¹.

What has been the effect of housing shortage on the living conditions of urban inhabitants? What are the likely impacts of the housing problems on the health of urban population? What has been done in terms of State interventions to improve the housing situation? Is the recently formulated housing policy suitable for tackling both quantitative and qualitative dimensions of urban housing? These and many other related questions need to be examined before formulating strategies and action programmes to achieve the goal of healthy housing for all by the year 2000.

URBAN HOUSING AND LIVING CONDITIONS

The ever widening gap between the demand and supply of housing in urban areas has severely affected the living conditions of city dwellers. Extreme overcrowding, dilapidated structures, absence of minimum basic amenities in the dwellings and lack of basic services in residential localities are common features of living conditions in all large cities in India.

An important indicator of the level of living conditions is the number of occupants per dwelling unit. The average number of persons per room in the urban areas in the country which was 2.63 in the year 1961 increased to 2.78 in 1974. Similarly, the number of persons per dwelling in urban areas increased from 5.63 in 1961 to 5.74 in 1981.

As per the National Sample Surveys conducted in the 7th, 19th and 28th rounds, 9.63 per cent of households in urban areas in the country, in 1974, did not have any shelter at all. The percentage of those living in one-room dwellings increased from 37 per cent in 1955 to about 51 per cent in 1974 (Exhibit 6).

The total urban housing stock in the country in 1981 was 28 million, comprising 18 million *pucca*, 6.8 million semi-*pucca* and 3.2 million *kutcha* houses (see Exhibit 7 for the definitions of different types of houses). For the country as a whole and for the four largest metropolitan cities, the proportions of *pucca*, semi-*pucca* and *kutcha* dwellings in urban areas are shown in Exhibit 8. Of the total housing stock in urban areas, in 1981, 21 per cent were more than 40 years old and about 10 per cent more than 60 years old¹². Most of the old dwelling units were in dilapidated condition, requiring replacement through new construction or upgrading through major repair work.

According to estimates of the National Sample Survey, access to municipal tap water in urban areas increased from 45 per cent in 1954 to 67 per cent in 1974. The situation in metropolitan cities like Calcutta, Bombay, Delhi and Madras is much better where about 90 per cent of households have access to tap water¹³ (Exhibit 9). However, the water supply in most cities is limited to a few hours per day only. About one-third of the dwellings in urban areas, in 1974, were without any facility of latrine. The proportion of households using the flush system of latrine was 12 per cent in 1962 and 20 per cent in 1974 (Exhibit 10). The 31st round of the National Sample Survey conducted in 1976–77 for slum areas showed that 82 per cent of the slum households in cities with population of one million and above

did not have any toilet facility in their dwellings.

A survey conducted in Bangalore City, in 1974, estimated that firewood and kerosene were the two most commonly used fuels by the sample households for cooking and other purposes, followed by electricity, gas, charcoal and others¹⁴. Between gas and electricity, while more gas was used as the main fuel than electricity, the reverse was true in the case of secondary fuel. As the main or secondary fuel, gas was used by 16 per cent households and electricity by 15 per cent (Exhibit 11).

In terms of floor space of the dwelling units, 11 per cent households in the city lived in a floor space of less than 100 sq. ft. and 70 per cent had dwelling units of upto 500 sq. ft. Sixty three per cent of the households did not own their dwelling units and lived in rented houses (Exhibit 12).

HEALTH IMPLICATIONS OF HOUSING

In a study on health status of the residents of Kanpur City, the Kanpur Development Authority has estimated that 60 per cent of the city's children below 6 years of age were infected by TB, the highest incidence of TB in the country. A third of the slum dwellers in the city were reported to be continuously sick¹⁵.

A health survey in the Calcutta Metropolitan District undertaken by the Calcutta Metropolitan Development Authority in the early 1980's revealed the following:

Maternal mortality rate	:	3 per thousand
Infant mortality rate	:	100 per thousand
Sickness incidence for acute diseases	:	3 per cent
Sickness incidence for chronic diseases	:	6 per cent
Morbidity due to Gastro-intestinal infection including enteric fever	:	35 per cent
Morbidity due to respiratory diseases	:	10.9 per cent
Morbidity due to accidents	:	5.8 per cent
Morbidity due to Cardio-vascular diseases	:	8.7 per cent
Morbidity due to dermatitis	:	4.3 per cent

Compared to the above health characteristics of the Calcutta Metropolitan District, a survey conducted in ten slum areas of the city clearly showed that the families below the poverty line (about 55

per cent) had higher incidence of chronic illness and current sickness and malnourishment among children representing well over 44 per cent of the population in that income group¹⁶. Another study by the Calcutta Metropolitan Development Council, of an upgraded slum showed that the incidence of TB was ten times higher than that in a nearby non-slum area, viral infections two to five times greater and skin diseases twice as high.

The urban garbage in Indian cities is usually left lying in the open, spreading diseases; open-air defecation is a common practice in almost all the slum areas in the cities, in the absence of access to latrines. A proper sewage system being highly expensive, is available only in planned residential areas of metropolitan cities. The open sewer system in small and medium towns and slum areas pollute water sources and create cesspools adjacent to housing structures which breed carriers of various diseases.

Several epidemics of dengue fever in the urban areas are reported at regular intervals. The outbreaks of gastroenteritis and cholera are equally common. In 1988, the outbreak of cholera in trans-Yamuna localities of Delhi was so serious that hundreds of people died in a short period of a few days. Similarly, a couple of years ago, in one of the localities in the central part of Bangalore City, the contamination of drinking water caused by the old leaking water pipelines running next to the sewer lines, resulted in a severe epidemic of gastroenteritis and yellow fever in the locality. As regards the adequacy of drinking water, at present the residents of Bangalore get water supply of only 75 litres per capita per day as against the desirable norm of at least 200 litres.

POLICY RESPONSE TO HOUSING SHORTAGE

The Seventh Five Year Plan of the Government of India, in its chapter of Housing, states:

“In fulfilling the basic needs of the population, housing ranks next only to food and clothing in importance. A certain minimum standard of housing is essential for healthy and civilized existence. The development of housing, therefore, must enjoy high priority in a poor society such as ours where housing amenities are far below the minimum standards that have been internationally accepted. Housing activity serves to fulfil many

of the fundamental objectives of the plan: providing shelter, raising the quality of life, particularly of the poorer sections of the population; creating conditions which are conducive to the achievement of crucial objectives in terms of health, sanitation and education; creating substantial additional employment and dispersed economic activity; improving urban renewal and interpersonal equity through the narrowing down of differences in standards of living and, last but not least, generating additional voluntary savings."

In the First Five Year Plan itself, the problem of urbanisation was, viewed, largely in terms of the shortage of housing in urban areas. As early as in September 1952, the first public housing scheme, viz., subsidized housing for industrial workers was introduced. Subsequently, several other housing schemes such as Low Income Group Housing, Slum Clearance Scheme, Dock Labour Housing Scheme, Rental Housing Scheme were started during the various plan periods. Details of some of the schemes are given below:

LOW INCOME GROUP HOUSING

This scheme was introduced in November 1954 and has continued since then. Under the scheme, long-term housing loans at reasonable rates of interest are provided to persons whose annual income does not exceed Rs. 6,000 and to cooperative societies whose members fulfil this condition. The quantum of loan assistance is 80 per cent of the total cost of construction or Rs. 8,000, whichever is less. The Seventh Five Year Plan recommended raising of these ceilings. It was suggested that the range of beneficiaries should be widened to include all those in the monthly income range, Rs. 01-1500, and that the ceiling on loans should be raised to Rs. 23,000.

Under this scheme, loans are provided also to the State Governments for the acquisition and development of land and its allotment to prospective builders. Assistance under this scheme is given also to the local bodies, public institutions run on no-profit no-loss basis, and recognized health, charitable and educational institutions.

SLUM CLEARANCE SCHEME

This scheme was introduced in May 1956 and has been continuing since then. Under this scheme State Governments were required to acquire slum areas for demolition and clearance. At the same time,

houses were to be provided to erstwhile slum dwellers for their re-housing. Provision of financial assistance to State Governments was made for this purpose. Under the provisions of the scheme, Government of India was to provide 25 per cent of the cost as subsidy and 50 per cent as loans, repayable over a period of 30 years, to State Governments which were required to provide the remaining 25 per cent of the cost as subsidy from their own means. The subsidy contribution from Government of India was, later on, raised to 37.5 per cent of the cost.

In the beginning the slum clearance effort was mainly concentrated in the six cities, viz., Calcutta, Bombay, Delhi, Madras, Ahmedabad and Kanpur. However, in the Third Plan, it was proposed that slum clearance and improvement work could be taken up wherever State Governments considered that a slum problem existed in acute form. The main problems in the implementation of this scheme are stated to be : (i) the delay involved in the acquisition of slum areas, (ii) non-availability of alternative sites at reasonable cost near the existing places of work of the slum dwellers, and (iii) the reluctance on the part of slum dwellers to move away from the area in which they have been residing.

ENVIRONMENTAL IMPROVEMENT IN SLUM AREAS

The necessity of this scheme was highlighted in the Third Five Year Plan itself. However, at the initial stage, it was conceived as supplementary to the scheme of slum clearance and this continued to be so till the middle of the Fourth Five Year Plan. It was only in 1972 that improvement as distinct from clearance was initiated as a separate programme in the Central Sector. Its object was to provide a minimum level of services like water supply, sewerage, drainage, paving of streets, and street lighting in the slum areas.

Initially, this scheme was introduced in the slum areas of 8 cities with a population of 800 thousand or more, and was later extended to 9 more cities, one in each of the states where no such large cities existed. It was estimated that with an expenditure of Rs. 300 million about 3 million slum dwellers were benefited by the end of the Fourth Five Year Plan (i.e. March 1974). The scheme was continued in the Fifth Five Year Plan under the Minimum Needs Programme, with a provision of Rs. 500 million. The scheme was proposed to be extended to all cities with a population of 300 thousand and above, and one city/town in each of the states where no such large cities existed. It

was estimated that about 6.8 million slum dwellers were benefited by the scheme by March 1980. The scheme has since been continuing under the Minimum Needs Programme.

In the Sixth Five Year Plan, a provision of Rs. 1,514.5 million was made for this scheme for the benefit of about 10 million slum dwellers at a per capita expenditure of Rs. 150. In 1984, the per capita expenditure was stepped up to Rs. 250 and also, the scheme was made applicable to all urban areas irrespective of the size of the urban area. Further, it was emphasized that priority would be given to the slums inhabited by the Scheduled Castes or scavengers etc. In the Seventh Five Year Plan, the outlay was enhanced to Rs. 2,695.5 million. It was estimated that by the end of the Seventh Five Year Plan about 24 million slum dwellers would have received the benefit of this scheme.

OTHER SCHEMES

Besides the above scheme, a number of other schemes for providing houses to the low and middle income groups of urban population have been evolved and implemented since the inception of Five Year Plans in India. Efforts have been made to promote construction of houses by

- i) providing subsidies to industrial workers,
- ii) providing housing loans on reasonable rates of interest,
- iii) providing housing sites through the acquisition and development of land by public authorities,
- iv) controlling the supply of building materials, and
- v) evolving and demonstrating the improved building techniques for reducing the cost of construction etc.

Further, a number of organizations like Housing Boards, Housing and Urban Development Corporation, and National Building Organization have been set up for evolving and implementing the action programmes. The Seventh Five Year Plan proposed the setting up of a National Housing Bank.

HOUSING FINANCE

The Housing Finance approach of Government of India has primarily been in the form of direct investment by public sector agencies.

Resources are mostly mobilised from nationalised banks, insurance companies and from the budgets of the Central and State Governments and channeled to State Housing Boards and Local Authorities for investment in public housing schemes. Housing and Urban Development Corporation (HUDCO), a Government of India corporation, is the principal agent for channeling the finances. HUDCO finances about 3 per cent of total housing investment in the country.

Another housing finance company, Housing Development Finance Corporation (HDFC), founded by International Finance Corporation (IFC), mobilises its resources primarily from household and corporate savings and lends finances for housing. It is still a small housing finance institution. It sanctioned loans for about 41,000 housing units in 1985–86.

NATIONAL HOUSING POLICY

In 1987, the International Year for Shelter for the homeless, Government of India started the process of developing a comprehensive National Housing Policy (NHP)¹⁸. After it was approved by the Indian Parliament, the NHP, expounding the objectives, priorities and strategies for promoting a sustained development of housing in the country, was released in May 1988 by the Government of India.

The objectives of the NHP are:

- i) To motivate and help all people and, in particular, the houseless and the inadequately housed, to secure for themselves affordable shelter through access to land, materials, technology and finance.
- ii) To encourage investment in housing in order to achieve a sustained growth of the nation's housing stock, and its proper conservation, renovation and upgradation.
- iii) To create an enabling environment by eliminating constraints and developing an efficient and accessible system for the delivery of inputs to maximise housing efforts.
- iv) To improve the environment of human settlements with a view to raising the quality of life through the provision of drinking water, sanitation and other basic services.
- v) To promote vernacular architecture and preserve the nation's rich heritage in the field of human settlements."

NHP also states that:

“Health and well-being of the people can be promoted by improving housing norms which are consistent with the prevailing socio-economic conditions and the local life style of the people.”

and provides the following guidelines for the formulation of housing schemes for the urban poor:

“In urban areas, for economically weaker section families, the size of the plot should not be less than 30 Sq mts. (which may be reduced to not less than 25 Sq mts. in metropolitan cities) with a provision of secure built-up accommodation of not less than one living room (of not less than 10 Sq mts.), a separate cooking space and low-cost sanitation toilet.”

This policy also recognises that a sizeable proportion of the urban population have inadequate housing and many of them have to take shelter in slums and squatter settlements. To tackle the health aspects associated with the housing problems of this section of urban population, it suggests *inter alia*, the following:

- i) provision of a minimum level of basic services like potable water, sanitation, drainage, street lighting and paved pathways,
- ii) involving the slum dwellers in slum improvement, upgradation and maintenance programmes through community approach,
- iii) modifying planning standards and building regulations to, *inter alia*, have a semi-pucca house recognised as an acceptable dwelling.
- iv) promoting low-cost water supply and sanitation
- v) promoting the use of smokeless *chulhas*.

The NHP further provides for the following policy measures:

- i) reviewing the entire gamut of legal provisions that create problems and inhibit housing activity
- ii) increasing availability and equitable distribution of land, its development and management
- iii) increasing easy access to institutional finance at affordable

rates

- iv) making provisions of fiscal incentives for channelising savings into housing finance institutions, bringing down the cost of construction materials, promoting manufacture of building materials and standardised building components, etc.
- v) involving housing and development agencies in catering to the needs, preferences and affordability of different households
- vi) developing human resources such as housing and development planners, administrators, architects, engineers and social, health and urban community development workers
- vii) strengthening research, development and extension efforts
- viii) promoting investment in conservation, upgradation, expansion and renewal of the existing housing stock
- ix) meeting the needs of housing for the specially disadvantaged groups such as handicapped, aged, destitutes, widows
- x) promoting rental housing
- xi) involving non-governmental organisations as effective linkages between public sector agencies and the people
- xii) harmonising the policies of economic planning and development with the policies and programmes in the housing sector
- xiii) ensuring healthy environment in human settlements
- xiv) preserving and protecting natural environment, ancient monuments
- xv) developing an appropriate Management Information System on housing stock, land, relevant laws and regulations, housing finance institutions, building materials etc.

The NHP document also lists a set of major goals for preparing an action plan and provides broad guidelines for its implementation, monitoring and evaluation.

REVIEW OF HOUSING POLICIES/PROGRAMMES

The WHO study on health impacts of housing policies in developing countries¹⁹, in its conclusion, states:

“Research findings suggest that urban housing and health conditions may not be significantly improved through policies that provide minimal support for the purchase of land and construction of houses, without concomitant improvements in the provision of services. Site-and-Services projects and upgrading programmes may not go far enough in providing low-income urban communities with the foundation for sustainable basic services, including water, sanitation, solid waste disposal, education and public health services.”

Reviewing the housing programmes for the urban poor in India, a Task Force of the Planning Commission, in its report submitted in 1983, observed:

“It is quite clear that the earlier so-called social housing schemes introduced by the Government of India and implemented by the State Governments were mainly directed towards construction of formal housing by Governmental, semi-governmental agencies and cooperatives. Amounts provided were meagre and the total number of houses constructed over a period of 30 years is just a minuscule portion of the country's total effort during the period and a fraction of the requirement.... The money would have gone much further if it had been spent on land development as basic services”²⁰.

With regard to the impact of various legal instruments the Task Force noted that

“from time to time in recent years legal impediments have been recognised as factors inhibiting the poor from improving their housing. These include zoning regulations, standards of services, minimum plot sizes, maximum densities, building bye-laws, construction standards and so on. Although relaxation of standards to suit the circumstances of the weaker sections has been recommended, it is seen that progress has been slow.”

Another study on the housing programmes for the urban poor

observes that the NHP reflects the government's move from propagating social housing to affordable housing; from need-based programmes to a demand-based policy²¹. According to this study a policy based on affordability principles should give up any pretensions of helping the poor in their housing endeavour. If the government is concerned about improving the housing situation of the poor, more funds have to be allocated for the purpose. The study further suggests that

“The ultimate solution to the problem of housing, however, is to treat the causes rather than the symptoms. The root cause is a level of income which is so low that, at existing prices, even an extremely modest housing of acceptable standards is beyond the affordability limits of the poor. Clearly efforts have to be directed both at improving the income status of the poor and at the same time working for solutions towards reducing the cost of housing.”

Studies on the urban housing situation in the country have identified several factors which inhibit the supply of urban housing. The major factors identified are: land legislations, rent control, housing finance, shortage of building material, building bye-laws, and property taxation.

One of the major problems associated with publically supported housing finance programmes, which are primarily meant for low income groups, is stated to be inappropriate diversion of the finances to middle and upper income groups. Inefficient use of scarce resources in public projects and low recovery rates are other major problems. With limited public financing available, most housing is financed by private efforts through the liquidation of assets and high-cost informal financing. Suggestions have, therefore, been made to expand supply of private housing finance through a market-oriented housing finance system.

The first step to achieve the objectives of the National Housing Policy has been the recent creation of National Housing Bank to:

- i) mobilise resources for the housing sector
- ii) promote housing finance institutions both at local and regional levels
- iii) provide financial, technical and administrative assistance

- iv) regulate the working of housing finance institutions at all levels
- v) provide advisory services in operational policies, and
- vi) identify the legal, fiscal, institutional and other constraints to the development of the housing finance system.

A number of fiscal incentives for housing investment have also been announced in the Central budget of 1989–90.

The National Commission on Urbanisation has defined the shelter problem as comprising

- i) how to increase shelter supply
- ii) how to improve and upgrade slums, and
- iii) how to conserve existing housing stock.

The commission observes that housing and infrastructure investments are productive, they are investments in an asset that yields a flow of services over time and they should be evaluated like any other productive investment.

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EXHIBIT 1

Features of Housing Design and The
Diseases They May Help Overcome

<i>Design feature</i>	<i>Diseases combated</i>
<i>Strong association</i>	
Adequate supply of water	trachoma, skin infections, gastroenteric diseases
sanitary excreta disposal	gastroenteric infections including intestinal parasites
safe water supply	typhoid, cholera
bathing and washing facilities	schistosomiasis, trachoma, gastroenteric and skin diseases
means of food production control of air pollution	malnutrition acute and chronic respiratory disease and malignancies
<i>Fairly strong association</i>	
ventilation of houses (where there is smoke from indoor fires)	acute and chronic respiratory diseases
control of house dust	asthma
siting houses away from vector-breeding areas	malaria, schistosomiasis, filariasis, trypanosomiasis
control of open fires, protection of kerosene or bottled gas	burns
finished floors	hookworm
screening	malaria

Some association

control of use of thatch material	Chagas' disease
rehabilitation of housing	psychological disorders
control of heat inside shelter	heat stress
adequate food storage	malnutrition
refuse collection	Chagas' disease, leishmaniasis

Source: Stephens, B. *et al.* "Health and Low-cost Housing," *World Health Forum*. Vol. 6, 1985, pp.59–62, as presented in WHO. *Improving Environmental Health Conditions in Low-Income Settlements*. Geneva: World Health Organization, 1987².

EXHIBIT 2
Selected Death Statistics, India

<i>Year</i>	<i>Death Rate per 1000 population per annum</i>		
	<i>Rural</i>	<i>Urban</i>	<i>Total</i>
1971	16.4	9.7	14.9
1976	16.3	9.5	15.0
1981	13.7	7.8	12.5
1983	13.1	7.9	11.9
1986	12.2	7.6	11.1

Reported cases of Deaths due to Selected Diseases in 1987:

	<i>Cases</i>	<i>Deaths</i>
Cholera	11,423	224
Dysentery	87,41,081	2,109
Gastro-enteretis	13,38,594	4,621
Malaria	16,63,284	185

EXHIBIT 3

Health Principles of Housing

I. Principles Related to Health Needs

1. *Protection against communicable diseases*

- 1.1 *An adequate supply of safe and potable water* assists in preventing the spread of gastrointestinal diseases, supports domestic and personal hygiene and provides an improved standard of living.
- 1.2 *Sanitary disposal of excreta* reduces the faecal-oral transmission of disease and the breeding of insect vectors.
- 1.3 *Adequate and safe disposal of solid domestic waste* reduces health risks and help to provide a more pleasant living environment; appropriate methods of storage and disposal discourage insect and rodent vectors of disease and protect people against poisonous substances and objects likely to cause accidental injury.
- 1.4 *Efficient drainage of surface waters* helps to control communicable diseases, safety hazards, and damage to home and property.
- 1.5 Adequate housing includes facilities for *personal and domestic hygiene*, and people should be educated in hygienic practices.
- 1.6 Healthy dwellings provide facilities for the *safe preparation and storage of food*, so that householders can employ sanitary food handling practices.

2. *Protection against injuries, poisonings and chronic diseases*

- 2.1 *The proper siting, structure and furnishing of dwellings* protects health, promotes safety and reduces hazards
- 2.2 *Adequately designed, constructed and ventilated dwellings*, free of toxic and irritating substances, reduce the risks of chronic respiratory diseases and malignancies
- 2.3 Sensible precautions in the household *reduce exposure to hazardous chemicals*

2.4 Where dwelling is also used as a work place, those who live in it should be *protected against hazardous chemicals and contamination*

3. *Reducing psychological and social stress to a minimum*

Adequate housing helps people's social and psychological development and reduces to a minimum the psychological and social stresses connected with the housing environment.

4. *Improving the housing environment*

Suitable housing environments provide access to places of work, essential services and amenities that promote good health.

5. *Making informed use of housing*

Only if residents make proper use of their housing can its health potential be realised to the full.

6. *Protecting populations at special risk*

Housing should reduce to a minimum hazards to the health of groups at special risk from the conditions they live in, including women and children, those who live in substandard housing, displaced and mobile populations and the aged, the chronically ill and the disabled.

II Principles Related to Health Action

7. *Health advocacy*

Carried out by the health authorities and bodies in related fields should be an integral part of public and private decisions about housing. Health advocacy should work through a multiplicity of channels and media.

8. *Economic and social policies*

That affect the state of housing should support the use of land and housing resources to maximize physical, mental and social health.

9. *Intersectoral action for development planning and management*

Economic and social development, as it affects human shelter, should be based on appropriate process of planning, the formulation and implementation of public policy and the provision of services, with intersectoral collaboration in development plan-

ning and management.

10. *Education on health housing*

Public and professional should actively foster the provision and use of housing to promote health.

11. *Community cooperation and self-help*

In dealing with the needs and problems of the human habitat, community involvement at all levels should support the process of self-help between neighbours, and communal cooperative activities

Source: WHO⁵.

EXHIBIT 4

**Estimate of Slum Population in
Metropolitan Cities, 1981**

<i>City</i>	<i>Population 1981 (million)</i>	<i>Slum Population NBO Task force*</i>		<i>Environment Improvement of Slums (coverage) Upto Mar.'81</i>
Calcutta	9.17	35.4	35	27.22
Greater Bombay	8.23	38.3	40	31.22
Delhi	5.71	30.2	45	7.64
Madras	4.28	31.9	30	12.40
Bangalore	2.91	10.0	20	2.39
Hyderabad	2.53	21.3	20	3.87
Ahmedabad	2.52	26.2	20	0.47
Kanpur	1.69	40.3	40	3.66
Pune	1.69	17.7	15	2.36
Nagpur	1.30	25.0	30	4.07
Lucknow	1.01	38.8	35	2.96
Jaipur	1.00	15.6	25	1.74

Source: Government of India (1983)¹⁶

EXHIBIT 5
Estimated Housing Investment

<i>Five Year Plan</i>	<i>Plan expenditure in housing</i>	<i>Total investment in housing (Rs. ten million)</i>			<i>Investment in housing as percent of total investment in the economy</i>
		<i>public</i>	<i>private</i>	<i>total</i>	
I	49	250	900	1,150	34
II	78	300	100	1,300	19
III	169	425	1,125	1,550	15
Three Annual Plans	79	250	900	1,150	NA
IV	170	625	2,175	2,800	12
V	541	1,044	3,636	4,680	10
VI	1,127	1,491	11,500	12,991	7.5
VII	1,879	2,858	29,000	31,858	NA

Source: Government of India, Five Year Plans I to VII

EXHIBIT 6

**Distribution of Households by Dwelling
Size (Number of Rooms) in Urban Areas
in India — 1954, 1965, 1974**

<i>Number of Rooms</i>	<i>Per cent Households</i>		
	<i>1955</i>	<i>1965</i>	<i>1974</i>
No Room	9.6
One	36.6	51.9	51.1
Two	34.1	27.2	25.0
Three and above	29.3	20.9	14.3
Total	100.0	100.0	100.0
Average number of persons per household	2.3	2.0	2.4
Average floor space (sq mt.) per person	7.7	Not Available	6.9

Source: Based on National Sample Survey Round Nos. 10, 19 and 28¹¹.

EXHIBIT 7

Definition of House Types in India

Pucca House is one whose walls and roof at least are made of burnt bricks, stone, cement, concrete, jack board (cement plastered reeds) or timber, tiles, galvanised iron or asbestos cement sheets and stone blocks used in construction of roofs are regarded as *Pucca* material.

Katcha House is one whose walls and roof are made of unburnt bricks, bamboo, mud, grass, leaves reeds or of thatch.

Semi Pucca House is one which is neither exclusively *pucca* nor *Katcha*. Generally, a semi-*pucca* structure comprises walls made of *pucca* materials, namely, stones, oven burnt bricks etc., and roofs made of *katcha* materials, namely mud, grass, etc. In some cases, it may consist of walls of *katcha* materials like unburnt bricks, bamboo, etc., and roofs of *pucca* materials like timber, jack board etc.

EXHIBIT 8

Quality of Dwelling Structures in Urban Areas

<i>Year</i>	<i>Pucca</i>	<i>Semi Pucca</i>	<i>Katcha</i>
All India Urban			
1961	46	35	19
1971	64	23	13
1981	64	24	11
Calcutta (1971)	86	1	13
Bombay (1971)	73	..	27
Delhi (1971)	82	9	9
Madras (1971)	69	4	27

EXHIBIT 9

**Distribution of Households
by Source of Drinking Water
in Urban Areas in India — 1954, 1965, 1974**

<i>Source</i>	<i>Per cent Households</i>		
	<i>1954</i>	<i>1965</i>	<i>1974</i>
Tap	45.4	60.3	67.0
Well	40.5	24.3	18.1
Tubewell	5.3	11.3	12.7
Tanks and ponds	5.4	1.3	0.8
Rivers, lakes and spring	3.4	1.4	1.0
Others	..	1.4	0.4
Total . . .	100.0	100.0	100.0

Source: Based on National Sample Survey Round Nos. 7, 19 and 28¹¹.

EXHIBIT 10
Distribution of Urban Households
by Type of Latrine

<i>Type of Latrine</i>	<i>Per cent Households</i>	
	<i>1962</i>	<i>1974</i>
Flush	12.4	20.1
Septic Tank	4.7	13.9
Services	—	30.3
Bucket	28.4	—
Pit	8.5	—
No latrine	36.9	33.0
Others	9.1	2.7
Total . . .	100.0	100.0

Source: Based on Natural Sample Survey Report No 146 and *Sarvekshana* Vol I No. 2¹¹.

EXHIBIT 11

Per Cent Households by Type of Fuel Used,
Bangalore City, 1974

<i>FUEL</i>	<i>Per cent Households</i>	
	<i>Main fuel</i>	<i>Secondary fuel</i>
Firewood and/ or Kerosene	79.2	28.5
Gas	12.3	3.6
Electricity	5.6	9.1
Charcoal and Others	2.9	4.3
Total	100.0	100.0

EXHIBIT 12

**Distribution of Rented Dwellings
by Floor Space, Bangalore City, 1974**

<i>Floor Space (Sq. ft)</i>	<i>Percentage Households</i>	<i>Cumulative Percentage</i>
<hr/>		
Upto 100	11.4	11.4
101-200	24.0	35.4
201-300	19.2	54.6
301-500	15.6	70.2
501-800	10.1	80.3
801-1000	7.2	87.5
1001-1200	5.8	93.3
1201-1600	3.9	97.2
1601 +	2.8	100.0
<hr/>		
Per cent households in Rented Dwellings :	62.8	
Per cent households in Owned Dwellings :	32.9	
Per cent households in Other Dwellings :	4.3	
Total sample size:	1745 households	

Source: Bangalore City Survey Project, 1974

SLUMS IN INDIA

INTRODUCTION

Urbanization is a natural consequence of industrialization, which accompanies migration from rural areas and smaller towns to bigger cities. The cities act as magnets and exert a 'pull' on the villagers, whereas the rural areas exposed to problems caused by changing agricultural scenarios (such as a weakening of agro-industrial base) exert a 'push' on the same people. These migrants need housing, and prefer to live as close to their places of work as possible. Those who can afford to pay for a decent or reasonably satisfactory house, and are able to find it, have no problem. The less fortunate ones settle for anything, a slum or even a pavement. Do people deliberately go to live in slums, or form slum houses, because they are used to such living conditions in the places they come from? Or, are they forced to live in such sub-human living conditions because of social and economic compulsions? These questions are difficult to answer, since the phenomenon of slum formation in India and elsewhere is a complex one. Bergel writes: "The slum is a complex product of many factors, as is true of many other social phenomena. But poverty is the foremost cause"¹. He describes a variety of factors causing formation of slums, or making people live in slums:

- low wages earned,
- inadequate care of their dwellings by residents,
- non-availability of housing.

Slums may be formed due to physical and socio-economic factors, or

This case was prepared by Basu Ghosh, Indian Institute of Management, Bangalore. It is intended as a basis for discussion rather than to illustrate either effective or ineffective handling of an administrative situation. Funds for its preparation were provided by a grant from WHO. Case III.2.

even failure of certain administrative agencies². These factors are summarized as under:

- variation in density of population,
- industrialization,
- expansion of city limits,
- distance between residence and place of work,
- usage of structures,
- renewal programmes,
- other city development activities,
- land use patterns within slums,
- refugees,
- ownership of land,
- animal population, etc.

After reviewing several theories of slum formation, developed in the west, Dhadave concludes:

“The process of urbanization in India is not always due to industrialization but due to the pressure of population on land in the rural economy which prompted the migration of rural masses to urban centres with a desire to get jobs. Slums in the cities grow not because of the scarcity of housing facilities alone, but because of unemployment and under-employment resulting in low levels of family income.... It is also true that social segregation of the out-castes forces them to lead a secluded life in the outskirts of the city”³.

It is evident that slum formation and proliferation of slum households is an extremely complex phenomenon fuller understanding of which is required in order to evolve an effective strategy for tackling the slum problem. There is also a great deal of disagreement about what constitutes a slum. (See Exhibit 1 for a variety of definitions). This reflects how the slum phenomenon may be viewed completely negatively or with a tinge of social realism.

The slums have, however, become an integral part of Indian cities. Is there any hope of an effective solution to this problem? Is it at least possible to improve the health situation of the urban poor inhabiting

the slums, through appropriate development programmes? Development policy-makers, social scientists and health administrators are constantly seeking answers to these questions.

BACKGROUND

An indicator of the size of the slum problem is the percentage of city population living in slums (See Exhibits 2A, 2B and 2C). In metropolitan cities about 1 among every 3 people live in slums. According to one estimate, about 33 million people live in urban slums in India⁴. This population size (about the entire population of Gujarat State) is expected to grow further with increasing industrialization and urbanization. One cannot, therefore, ignore the slum problem as concerning only a few. Let us now look at the profile of slum inhabitants.

A study of slums in seven cities of Gujarat reveals that slums are inhabited predominantly by members of backward communities (scheduled castes/scheduled tribes)⁵. (See Exhibit 3).

In Bangalore City slums, 54 per cent of the inhabitants are Scheduled Castes⁶. Another survey of Gulbarga City (Karnataka) also reveals that "the slums are mostly inhabited by scheduled castes and backward castes only, and not by upper caste groups"⁷. This study further reveals that some slums are mostly occupied by a single caste group. A recent study in Bombay also finds that 48 per cent of the population in a slum consist of scheduled caste/scheduled tribe people⁸. There are exceptions to this phenomenon: a slum in Bombay is found to have only 36 per cent of the inhabitants belonging to scheduled caste/scheduled tribe and other backward class communities⁹. An early study of Madras slums revealed that 70 per cent of the scheduled caste population in the city lived in slums¹⁰.

A large percentage of the slum dwellers are illiterate. (See Exhibit 4). The employment profile of slum inhabitants varies with the industrial/trade scenarios in cities. In Gujarat slums it is noted that "the slum people of large cities ... are more dependent on regular jobs than the slum people in other cities"¹¹. In Ahmedabad slums, as high as 50 per cent of the working inhabitants are found to be employed in large industries, another 14 per cent work in service sector (banks/LIC etc). In small cities such as Rajkot 44 per cent of the slum work-force work in miscellaneous occupations, and another 20 per cent in trade. Overall share of the work force in Gujarat slums is as

under:

Large industry (27%), miscellaneous (23%), service/bank/LIC (18%), small industry (13%), trade (12%), transport and construction (4%) and others (3%).

In Bangalore slums, construction workers (19%), service workers (18%) and other production workers (17%) constitute the majority of the work force¹². The next two groups of workers are: coolies (labourers) 14 per cent and clerical/sales workers 14 per cent. In contrast Gulbarga slums house unskilled workers (20%), skilled labourers (21%) and casual workers (12%) as the major occupational groups¹³.

The income characteristics of slum inhabitants are more favourable compared to the rural poor, but their income is still not adequate to meet all the household needs. Average per capita monthly income in Gujarat slums is found to be about Rs. 42. In a Bombay slum, two-thirds of the households are seen to have Rs. 100–300 per capita income, while in Gujarat slums three-fourths of the households have monthly household income in the range Rs. 100–300. In Bangalore slums also, two-thirds of the households have monthly income in the range Rs. 100–300, and per capita monthly income is Rs. 35.

LIVING CONDITIONS IN SLUMS

A 1954–58 survey of slums in Calcutta notes: “Excepting about 10 to 12 per cent of the slum households, all others suffer from the absence of the ordinary amenities of life”¹⁴. Two out of every three households in Calcutta slums do not possess more than 30 sq.ft. of space per capita. Vast majority of the inhabitants (55%) have to share one lavatory with 10 to 49 other households. A large proportion of the households share a water tap with others. The rooms are not ventilated, and often do not protect their inmates against rain. A 1958 survey of Delhi slums reports that 82 per cent of slum households had only one room¹⁵. Sixty per cent of households have less than 125 sq.ft. A report on slums in Ahmedabad in 1961 indicates that 91 per cent households live only in one room accommodation¹⁶.

A survey of slums in Bombay (1959) presents the living conditions there¹⁷:

Slum A Per capita room space: 12 sq.ft.; average number of users per tap: 180; average number of users per latrine: 146.

Slum B Per capita room space: 7 sq.ft.

Slum C Per capita room space: 11 sq.ft.; average number of users per washing place: 75; average number of users per latrine: 45.

A 1979 slum survey of Bangalore finds: "Generally, the physical conditions of the slum present a picture of total neglect; there is absolute lack of any order; there are minimum facilities like water and sanitation, and electricity are conspicuously absent or woefully inadequate. Cesspools stagnate in front of each house"¹⁸.

The slum survey in Gujarat (1973–74) shows 15–40 per cent of the households in different cities have less than 100 square feet space per household¹⁹. 20–40 per cent households have 201 or more square feet. Number of households per latrine varied from 11 to 38, and persons per latrine vary from 59 to 377. In Ahmedabad slums 25 per cent of the households have less than 100 sq.ft. per household. In Gujarat slums, there are 135 persons per water tap, and 70 persons per latrine. In some of the towns, average persons per tap is 271 (Jamnagar), and 377 persons per latrine (Surat).

In a recent survey (1988–89) in Calcutta, it is found that on an average 4 persons live in a room with an area of 100 sq.ft.²⁰. Drinking water supply is inadequate and most households depend on common latrines.

In a Bombay slum (1988), only 25 per cent of the households are reported to enjoy a private tap in their portion, 45 per cent avail of a common tap for the building and 29 per cent collect water from a public stand post²¹. Almost all households use common latrine or a public latrine. In another Bombay slum (1988), 66 per cent of households collect water from a public stand post and another 11 per cent buy water²². In this slum, 58 per cent of the households use public latrines, whereas 40 per cent make use of open space around for defecation. (See Exhibits 2C and 5).

ENVIRONMENTAL SANITATION IN SLUMS

A survey of slums in old Delhi (1958) reveals that: over 20 per cent *katras* lack facility for drainage and 45 per cent with inadequate drains, drains are neglected, and animals live along with men²³. The slum environment everywhere is found to be less hygienic because of unsatisfactory environmental sanitation measures. Marshall B. Clinard, in an early treatise (1966) on the subject, quotes critical

observers as describing Indian slums as the filthiest in the world²⁴. He stated further:

“In the slums of India, however, the drains are generally open, the water is usually stagnant because of poor gradients, and the choked drains present sickening sights and offensive odours. Refuse is everywhere, and the few available containers are seldom properly used. More often trash, garbage and refuse are shoved into the drains or left on the streets.... The drains, and the children usually use them as latrines.... Their excreta, because of the very high incidence of disease among them, are the chief means of spreading such diseases as dysentery and cholera among the populace.”

Other factors known to aggravate the sanitation situation in Indian slums are: apathy to cooperate in maintaining cleanliness; indiscriminate urination; insufficient latrines, drains and dust bins.

The survey of slums in Gujarat (1974) finds the environmental sanitation in slums as described below:

“In many of the slum areas, garbage and other rubbish is left on streets and lanes; the dirty water is allowed to flow through open gutters even at times over their capacities. Refuse is seldom transported out of these areas as municipal vehicles cannot reach these spots regularly and thus all the garbage-mounds quickly start decomposing, spreading strong smell and polluted air all through lanes and houses, and everywhere in the neighbourhoods of slums”²⁵.

A study of a slum in Madras close to Adyar river (1981) finds the level of environmental sanitation there very unsatisfactory²⁶. Soil pollution due to open defecation, foul air, improper sewage disposal and inadequacies of water supply characterize the situation here. A 1988 study of a slum in Bombay finds people living there with open drainage, which remains mostly choked or unattended²⁷. Garbage disposal is not done, or removed irregularly so that 67 per cent of the households are dissatisfied with the garbage removal system. In another Bombay slum, though there is closed drainage, this is often choked or improperly maintained²⁸. There is dissatisfaction (among 20 per cent of the households) about garbage removal. “It was a common sight in the study area to find heaps of solid wastes rotting

over a period of time, causing health problems in the area.” (See Exhibit 2C).

HEALTH SITUATION IN SLUMS

A public health expert's comment in a 1957 conference, quoted from Marshall B. Clinard's treatise, sums up the potential health risks of living in slums:

“... It cannot be gainsaid that living in damp, insanitary, ill-ventilated and crowded houses in slums affects the health of the slum dwellers.... Food garbage is indiscriminately thrown in the open spaces, which serves as a breeding ground for flies. These flies have a ready access to the faecal matter.... They can easily contaminate all exposed food. The dangers inherent in consuming such food cannot be over-emphasized. Apart from diseases like typhoid, cholera and dysentery, diseases like ascariasis and hookworm are also spread by the exposed human excreta....”²⁹.

The 1958 Delhi Slum survey finds that the slum dwellers are not health conscious; 96 per cent of them are reported by themselves to enjoy satisfactory/good health³⁰. 6.4 per cent suffer from illness of some kind, and 1.2 per cent from physical disability.

Clinard (1966/1970) mentions a number of health issues affecting Indian slums:

- health behaviour of slum dwellers: who are ignorant of science of health and disease, consult quacks, fail to understand the importance of good health
- tendency of people to accept disease (e.g. chronic dysentery, hookworm, T.B) as ‘satisfactory’ health
- frequent outbreaks of epidemics of smallpox, cholera, typhoid and diphtheria
- refusal/unwillingness to accept immunizations
- poor personal hygiene
- risk of consumption of adulterated cereals, drugs, milk etc.

A study of the inhabitants of a slum in Madras (1981) has revealed that 95 per cent harbour one or more species of parasites³¹. Another common disease found here is amoeboid dysentery.

An investigation (1983) into the morbidity patterns of population according to their housing conditions reveal that in poor housing conditions (as in slums), the major diseases from which people suffer are³²:

<i>Disease</i>	<i>Per cent of sick people</i>
Infective and Parasitic	15.5
Respiratory	6.2
Digestive	4.8
Skin & subcutaneous	3.9

(See Exhibit 6).

An anthropometric study of slum dwellers (1984) finds that slum children have low growth potential apparently due to different environmental, cultural, economic and nutritional factors acting in combination³³. Another study of cancer deaths in slum and non-slum areas, finds that cancer death rate among slum-dwellers and non-slum dwellers is of the order of 4.4–4.6 deaths per 10,000, but liver cancer was more among slum dwellers than among non-slum dwellers³⁴. A higher proportion of the cancer patients in slums could not continue the allopathic treatment, after diagnosis of the case, probably due to financial constraints.

In two recent surveys (1988) of Bombay slums, where the Municipal Corporation of Greater Bombay established health posts in 1986, the short-term illnesses are found to consist mainly of fever (66 per cent and 75 per cent of sicknesses), stomach ailments (15 and 6 per cent), and body pain (7 and 5 per cent)^{35,36}. The long-term illnesses (present in 6–7 per cent households) in the same populations are characterized by respiratory diseases (7 and 44 per cent), heart diseases (16 and 32 per cent), diabetes (9 and 21 per cent), cancer (2.2 and 1.6 per cent), and skin diseases (2.2 and 1.6 per cent). About 1.7–2.7 per cent households contain physically or mentally disabled persons. The main disabilities are: crippled due to polio (63 and 21 per cent of the disabled), disabled leg (16 and 36 per cent), mentally retarded (5 and 14 per cent). Analysis of causes of death shows the principal causes as under:

Slums in India

<i>Slum A</i>	<i>Slum B</i>
1. Old age 25.9 %	1. Accident 14 %
2. Heart disease 19.7 %	2. Stomach ailment 14%
3. Respiratory 12.1 % disease	3. Fever 14%
4. Epilepsy 9.1 %	4. Respiratory disease 10.5%
5. Stomach ailment 7.6 %	5. Heart Disease 10.5%

The immunization status in one of these two slum areas can be summed up as under:

<i>Immunization</i>	<i>Age Group (%)</i>		
	<i>0-12</i>	<i>13-60</i>	<i>61-120 Months</i>
Triple Antigen III dose	46.2	40.3	36.6
Polio III dose	45.3	42.3	31.6
B.C.G	40.9	21.8	22.7
Measles	0.6	0.9	0.4
B.C.G + Measles	19.5	60.4	61.1

The apex public health institute in India viz., All India Institute of Hygiene and Public Health, Calcutta operates an Urban Health Centre in Chetla, Calcutta, catering to health needs of mainly slum dwellers and other concentrations of urban poor. In this area, 17.3

per cent of deaths are reported to be due to infective and parasitic diseases³⁷. The causes of deaths in specific age-groups are as under:

<i>Age-group (Years)</i>	<i>Principal causes (% of deaths)</i>
Below One year	Pneumonia, bronchitis and bronchopneumonia (27%), Dysentery, diarrhoea, gastro-enteritis and colitis (23%), Prematurity (21%) Septicaemia (10%).
1-4	Pneumonia, bronchitis and bronchopneumonia (33%), Dysentery, diarrhoea, gastro-enteritis and colitis (21%), Meningitis (13%) Malnutrition, rickets and marasmus (8%), Encephalitis (8%).
50 +	Heart diseases including hypertension (26%), others (20%), cerebral haemorrhage and thrombosis (16%), Malignant neoplasms (9%).

(See Exhibit-7)

In one of the slums in Chetla Urban Health Centre area, an ongoing (1989) study notes:

“The children and women in this area were observed to be quite prone to minor ailments like cough and cold, influenza, diarrhoea etc., and the frequency of the spell was on an average once every month. But the people in this area were quite aware of health and visited the health centre or allopathic physician for medical care”³⁸.

In this slum, the immunization coverage is reported to be good:

Coverage of Infants:

	<i>Male (%)</i>	<i>Female(%)</i>
Measles	50	67
D.T	50	83
D.P.T	60	100
B.C.G	80	67
Polio	80	17

Coverage of Pre-School Children:

Measles	67	50
D.T	93	85
D.P.T	87	65
B.C.G	87	65
Polio	87	85

The diet survey in this slum reveals that “there is only marginal deficiencies in the protein intake among the diets of slum dwellers”. However, the study has detected, through clinical investigations, the prevalence of Vitamin A deficiency among children (0–14 years) and women (15–45 years). Other deficiency symptoms like angular stomatitis, glossitis and anaemia are found to be widely prevalent, possibly due to worm infestation, seasonal variations, diarrhoeal diseases etc.

A sociological investigation (1989) of slums in Gulbarga City (Karnataka) reveals: majority of the respondents (92 per cent) consider that the general level of the health of slum dwellers is good. Some of the respondents believe malaria, dysentery and other intestinal disorders, fever, cough and cold, typhoid and influenza are the common diseases there. The researcher concludes:

“.... it can be derived that majority of the families which are suffering from one or the other disease could not treat well because of poverty or paucity of money.

.... Slum dwellers are generally healthy. There is no indication that the slum dwellers have adverse effect on the general health condition of the slum population or the population of the city in general”³⁹.

Among the intervention measures tried out experimentally in some urban slums in India are (i) the use of a simple and cheap earthen pitcher with a narrow neck, and (ii) handwashing. Eltor cholera cases are regularly reported from city slums. Even provision of tubewell reduces incidence of disease. In an experimental study in some Calcutta slums, researchers from the National Institute of Cholera and Enteric Diseases, tried out two interventions: (i) chlorinating water stored in usual buckets, and (ii) provision of a narrow-necked earthen pitcher for storing of water meant for drinking and other domestic uses. The study has shown that: “a simple and cheap

earthenware pitcher with a narrow neck (the 'sorai') which was well accepted by the local community, was effective in reducing the transmission of infection"⁴⁰.

In the second study, undertaken in a Calcutta slum, handwashing with soap was implemented in a slum, and another slum (without handwashing) was treated as a control⁴¹. The study finds that: "a simple measure like washing hands with soap was effective in reducing dysentery (among children aged 5 years or more), but not watery diarrhoea in a metropolitan Calcutta slum".

POLICY RESPONSE TO SLUM PROBLEM 1950-89

Slums have often been regarded in the past as a nuisance, as a cynosure (conspicuous shabbiness in an otherwise clean city), and as cancerous growths (inevitable consequence of urbanisation). Slum dwellers have often been perceived as law breakers, encroachers, menials and anti-social elements. So, the natural response of the city authorities and private landlords has been the idea of demolition of the homes of thousands by bulldozing these shaky structures.

SLUM CLEARANCE

The governments responded to this situation by enacting Slum Clearance Act (e.g. the National Slum Clearance and Improvement Act, 1956 and the Mysore Slum Areas — Improvement and Clearance Act, 1958. See Exhibit 8 and Exhibit 9). Slum clearance schemes were introduced by different states beginning 1956. These schemes intended to provide new and better accommodation to the evicted slum dwellers through State Slum Clearance Boards (specially created for the purpose) and State Housing Boards. The policy of slum clearance has been questioned by many. According to a critic of this approach:

"Such destruction, however, would solve nothing, and would lead only to the development of even worse conditions on the ruins of the old"⁴².

It was argued that the proposal to build new houses for evicted families would be illogical and infeasible in terms of: "immensity of the physical problem ... government resources, the likelihood of increasing urbanisation, the fact that majority of slum problems cannot be attributed to physical conditions alone....". The intended beneficiaries resisted the idea of moving away, and having to pay even a meagre rent. The possibility of disruption of the fabric of their

established social life was also a factor prompting community resistance instead of community support and involvement.

Bangalore Experience

A newspaper report presents this account of the work of the Karnataka Slum Clearance Board:

“...on the periphery of the city, slum dwellers from central slums had been moved away from their workplaces to improved homes.

As part of their progress towards civilisation many of the inhabitants of Laggere (to the west of Bangalore) were moved from their old homes without prior warning. One woman I spoke to told me of her 23-year-old daughter who suffered the discomfort and inconvenience of premature child birth in a transit van, due to shock. Both mother and baby died. Once in Laggere, the inhabitants suffered the discomfort of a totally inadequate water supply. Eight people died of cholera... civilisation had forced them to live in a jungle”⁴³.

Bombay Experience

A Slum Improvement Board was set up in 1974. A census of slums was undertaken in 1976 to find that there were 1,680 slums in Bombay with a population of over 2.8 million, excluding pavement dwellers, roadside hutments etc. The slum dwellers had to go through many heart-breaking demolition nightmares. Bombay's housing situation worsened over the years, and slums further proliferated with the eventual scrapping of the Slum Improvement Board, and the emergence of the Maharashtra Housing and Area Development Board. All slums built before 1980 were regularised by the Maharashtra Government, and regularisation of slums built between 1980 and 1985 has been promised⁴⁴.

Delhi Experience

An indepth study of the impact of a resettlement programme in Delhi (effective 1977–78), based on two rounds of surveys, has reached the following conclusions:

- despite long stay the resettlers have not achieved any significant improvement in their socio-economic

conditions,

- availability of basic amenities such as water supply, electricity, education, health and sanitation is unsatisfactory compared to other residential areas in Delhi.
- no visible change has taken place in the life and living conditions of the resettled people because of inadequate steps to promote their income-generating abilities.
- 20 per cent of the original allottees sold or rented their plots⁴⁵.

Pune Experience

A resettlement project was initiated in Pune in 1983 reportedly to provide "an opportunity to low-income families to shift voluntarily from a large squatter area to a planed site". It was felt that as the slums were on steep slopes or low-lying areas, it would not be possible to provide basic facilities there. The resettlers were required to pay Rs. 14,750–18,300 for a tenement or Rs. 5,500 for a serviced plot. An official evaluation of the scheme reported that 19.8 per cent of the squatter households shifted to new homes, 23.8 per cent were in the process of shifting, 5.7 per cent withdrew their applications, and 50.7 per cent did not wish to participate at all. It is argued by a researcher that the evaluation report had failed to consider the people's response to the project. There were a series of events: organised opposition to the project by slum residents (who wanted basic amenities there instead of having to shift), litigations, representations to the government, issue of public notice of eviction and an appeal against notice to the tribunal (set up under the Maharashtra Slum Areas Act)⁴⁶.

ENVIRONMENTAL IMPROVEMENT OF SLUMS

A policy analyst comments: "By 1970 it was realised that slums should be accepted as providing a substantial component of urban housing stock and the best way of providing shelter to the urban poor. The scheme for environmental improvement of slums was launched in the Central sector in April 1972"⁴⁷.

Delhi Experience

An experimental project was started in Old Delhi (1958) with grants from Ford Foundation, to improve slums on the premises that: (a) "social change can be most effectively brought about *where people*

live", and (b) "such social change can best be achieved by working with groups of people rather than with individuals"⁴⁸. The project design provided for achieving the objectives: (i) establishing a department of urban community development, (ii) organisation of *Vikas Mandals* (citizen development councils), (iii) improvement of poor sanitary conditions, (iv) improvement of *mohalla* (neighbourhood) committees, and (v) civic campaigns to improve physical appearance. Professional social workers were engaged as community organizers. Based on the experience in pilot projects, national urban community development was initiated in 1965 with a number of new pilot projects.

Calcutta Experience

The Calcutta Metropolitan Planning Organisation (CMPO) proposed "The Bustee Improvement Programme for Calcutta and Howrah" in 1966⁴⁹. This scheme clearly demarcated areas:

- (a) in which clearance and new construction are proposed, and
- (b) in which existing bustees are to be improved.

The scheme proposed to confine areas in (a) to only certain areas of Central Calcutta and Howrah — which were distinct health hazards. Administrative management, project engineering, supervision of implementation of improvement schemes, maintenance of new sanitary facilities and social management for ensuring community participation. Basic amenities provided were: a water system, community water taps and baths, sanitary sewer system, sanitary latrines (4/100 people), storm drainage, pavements, lighting and treatment of tanks. The cost of the improvement scheme proposed was estimated to be Rs. 10.1 crores, as against Rs. 166.05 crores for total clearance and renewal for the same population. In 1970 the newly set up Calcutta Metropolitan Development Authority (CMDA) took up the programme for improvement of the city's slums⁵⁰. As per CMDA's claims Rs. 12 crores were spent till 1976 for 1,500 slums in core areas of Calcutta Metropolitan District, to provide new taps for potable water, replacement of service latrines by sanitary latrines and connect these to sewers/septic tanks, build pavements, install city lights, fill ditches and ponds, etc. What was the impact of this project? The success achieved is apparent from the following comment:

"But the taps are nowhere to be seen. Most of the public water taps have been removed, damaged or are unwork-

able. The water stands are filthy. When the taps do work, a thin stream runs for an hour or two, but that is all. Hardly anything has been done in regard to replacement of service latrines. Service latrines in the bustees around Calcutta dock has no water or sewerage connections most of time. Most of the roads are half constructed, turning them into open gutters, the construction is unscientific and with inferior materials, and even a brief downpour sends water and human excreta from the gutters gushing into the adjoining huts”.

Hyderabad Experience

Enthused by the success of the Ford Foundation-sponsored Delhi Pilot Project and similar projects in Baroda and Ahmedabad, a slum improvement project was begun in Hyderabad in 1967⁵¹. The project started with one project director, seven social workers and a budget of Rs. 50,000. By 1977, the project manpower increased to 225,500 people (including 60,000 slum dwellers) and the budget rose to Rs. 240,000. The project sought to encourage the slum dwellers to “accept the project as their own and not as an imposition by the government”. The scheme, hailed as one of India’s most successful programmes for slum dwellers, included:

- grant of legal title (*patta*) to squatters on the land occupied,
- assistance in laying out and constructing self-help low-cost housing,
- assistance for increasing access to organised financial sector.

Upto 1977, *pattas* were given to 13,000 families. Eight commercial banks, through their 86 branches, provided Rs. 40,000 per family against *patta* as security. Community contributions were by way of Rs. 1,000 (cash) from family, kind and labour. The Urban Community Development Department provided a facilitator of change (*Basti Sahayak*) in each slum area affected. In another pilot project (Devanagar Housing), municipal corporation, rotary clubs, banks, money lenders and residents cooperated to raise the costs of new houses in rebuilding a small slum neighbourhood.

The experimental project in Hyderabad was subsequently expanded

to spread over the whole city. The project aimed at “integration of social, economic and civic services ensuring the participation of slum dwellers in all these programmes”. This Hyderabad Slum Improvement Project intended to provide:

- Civic infrastructure,
- Housing in 34 slums,
- Health and nutrition (preventive health),
- Pre-school education, and
- Economic support programmes to uplift slum dwellers from the absolute level of poverty.

Extracts of the conclusions from an evaluation study of this project are given below:

- benefits of physical inputs programmes were cornered by more well-developed and mixed localities, to the neglect of the less developed ones,
- sewer lines, storm water drains were not functioning properly,
- condition of new asphalt roads was not satisfactory,
- difficulty of untrained slum residents in using modern technology,
- slum dwellers were found to be highly suspicious of each other, and not willing to volunteer their services.

The study suggested charging by the Corporation of a maintenance levy from the slum residents.

This Hyderabad Urban Community Development Project, according to an observer, has been heavily welfare-based and has not been able to take into account the need for planning on the basis of developmental needs of the city⁵³. The issue raised is that:

“... it may further encourage unauthorised growth of low-income housing. If unauthorised occupation of land is legitimized, and if loans for building on such land becomes more easily available, obviously the city has an added attraction for would-be migrants from the surrounding region”.

The number of slums in Secunderabad–Hyderabad, according to this

researcher, has grown over the years:

1962 .. 106

1972 .. 283

1976 .. 357

1986 .. 577

1988 .. 660.

Karnataka Experience

The Karnataka Slum Clearance Board was constituted in 1975, after passing an Act called the "Karnataka Slum Clearance and Improvement Act 1974". As part of its programme of environmental improvement of slums, the Board has provided basic amenities (like drinking water, street lights, bath rooms, sewer, drains and roads) to 615 out of 965 slums under its jurisdiction, at a cost of Rs. 779.90 lakhs. (See Exhibit-10). The Board states⁵⁴:

"the Slum Improvement Scheme is not yielding expected results, as the slum dwellers do not put them to proper use. The architects of slums are the slum dwellers themselves, hence any change in their living conditions is possible only by bringing about a change in their attitude towards life and desirable change in behaviour pattern of slum dwellers".

The Board has a housing scheme under which 6,373 EWS (Economically Weaker Section) houses have been constructed at a cost of Rs. 660.34 lakhs upto March 1989. Of these 2,499 houses have been distributed to the original slum dwellers.

An indepth evaluation of environmental improvement scheme implemented in Hassan town of Karnataka has been undertaken⁵⁵. Extracts of this evaluation are presented below:

- the programme has largely benefited the weaker section of society,
- the slum dwellers are not motivated/educated to be aware of the need to improve their own localities,
- the Municipal Council is not involved in implementation,
- the sister agencies viz., town planning, housing, municipal administration, water supply and drainage

board, pollution control department are not involved,
— sanitation continues to be very poor.

Gujarat Experience

The experience with similar efforts in Gujarat state is no different⁵⁶. In Surat, Baroda and a few other cities *pucca* bath rooms and latrines were constructed for the slum dwellers. Most of these were “left not only uncleaned and filthy but also regardlessly misused”. Some of these were used to keep animals, others for storage of scrap. Maintenance of these facilities was also difficult because of irregular water supply. It is argued that “it is not merely a problem of providing the facility to slums but also the problem of educating the masses too”.

SLUM UPGRADATION PROGRAMME

The scheme for environmental improvement of slums, initiated in 1972, did not include ‘development of structure on the site’ — which was to be carried out by the occupier⁵⁷. The VI Plan policy objectives (1978–83) provided for self-help housing schemes for economically weaker sections (EWS), with the government agencies expected to provide the infrastructure required. This appears to be a recognition of the fact that previous “emphasis on provision of basic services is only ameliorative in nature” and not “a long-term solution” to the problem⁵⁸. A possible policy response to this situation is formulation of Slum Upgradation Programmes, comprising provision of land tenure, maintenance and cost recovery. Such programmes, successfully tried out in Madras, hold future potentials for a lasting solution to the slum problem. Yet another solution proposed by some professional planners is the “planned slum” approach as an alternative to prevent slum formation⁵⁹.

PRIMARY HEALTH CARE FOR URBAN POOR

In recognition of the need for community-based primary health care, appropriate to the needs of the urban poor a committee entitled “Working Group on Reorganisation of Family Welfare and Primary Health Care Services in Urban Areas” (Krishnan Committee) was appointed by the Government of India. This Committee (1982) recommended setting up of Health Posts in areas with at least 40 per cent people living in slums or similar housing situation. Following

this committee's recommendations such health posts were set up in different states. In Greater Bombay, for instance, 56 health posts were set up in 1984 with 50,000 population per health post⁶⁰. The Committee proposed varying staff norms and package of services for areas with varying populations (5,000 to over 5,00,000).

OTHER DEVELOPMENTS

A National Housing Bank, set up with an equity capital of Rs. 100 crores, includes as one of its objectives: "formulating one or more schemes, for the economically weaker sections of society, which may be subsidised by the Central Government, or any State Government or any other sources"⁶¹.

The Government of India has adopted a National Housing Policy in May, 1988⁶². This policy document includes a separate section on "Informal Sector Housing and Slums" (See Exhibit 11 for further details).

WHO has recently advocated 11 principles in its publications entitled 'Health Principles of Housing'⁶³ (See Exhibit 12). These principles, if appropriately incorporated in India's response to the slum problem, may help in improving the health and quality of life of the urban poor.

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EXHIBIT 1

Definition of Slums

1. Oxford Universal Dictionary defines a slum as a
“street, alley, court etc., situated in a crowded district of a town or city inhabited by people of a low class or by the very poor; a number of these streets or courts forming a thickly populated neighbourhood or district of squalid and wretched characters.”
2. Slums, according to Marshall B. Clinard, have been commonly defined as:
“those portions of cities in which housing is crowded, neglected, deteriorated, and often obsolete. Many of the inadequate housing conditions can be attributed to poorly arranged structures, inadequate light and circulation, poor design and lack of sanitary facilities, overcrowding and inadequate maintenance.” (M.B. Clinard 1966/70).
3. Definition of slums by E.E. Bergel: “areas of substandard housing conditions within a city”.
4. The Slum Act of 1956 defines slums mainly in terms of substandard structure of housing, overcrowding, lack of ventilation, zero or near zero sanitation facilities.
5. Definition of slum by the U.N:
“Building, a group of buildings, or area characterized by overcrowding, deterioration, unsanitary conditions or absence of facilities or amenities which because of these conditions or any of them endanger the health, safety or morals of the inhabitants or the community.”
6. Another definition proposed is:
“dwellings that have inadequate ventilation, toilet and bathing facilities; that are in bad repair, damp and improperly planned; that are subject to fire and flood hazards; and that are often occupied by the poor.” (Operations Research Group, 1977).

7. Definition of Slum by the Seminar on Slum Clearance (Bombay, May 1957):

“A slum, may be described as a chaotically occupied, unsystematically developed and generally neglected area which is overpopulated by persons and overcrowded with ill-repaired and neglected structures.” (A.R. Desai and S. Devadas Pillai, 1970).

EXHIBIT 2A

Slum Population in Some Cities/Urban Centres

<i>City</i>	<i>Population in Slums</i>	
	<i>Year</i>	<i>Per cent</i>
1. Calcutta	1981	35
2. Bombay	1981	38
3. Delhi	1981	30
4. Madras	1981	32
5. Bangalore	1981	10
6. Hyderabad	1981	21
7. Ahmedabad	1981	26
8. Kanpur	1981	46
9. Pune	1981	18
10. Nagpur	1981	34
11. Lucknow	1981	39
12. Jaipur	1981	16
13. Jamnagar	1974	22
14. Surat	1974	20
15. Nadiad	1974	13
16. Baroda	1974	11
17. Bhavnagar	1974	10
18. Rajkot	1974	7
19. Visakhapatnam	1968	35

Source: For Sl. Nos. 1 through 12: S. Siva Raju and I. Udaya Bhaskara Reddy: "Urbanization and Urban Problems in India", *Nagarlok* Vol. XVIII July–September 1986, No. 3.

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For Sl. No. 19: V.L.S. Prasada Rao: "Urbanization in India: Spatial Dimensions", 1983.

EXHIBIT 2B

**Estimated Slum Population by Size Class of
Urban Area in 1981**

<i>Population size class of cities/ towns</i>	<i>Number of cities/ towns</i>	<i>Urban Population (million)</i>	<i>% Slum Population in urban areas</i>
<hr/>			
1 million +	12	42.02	30.78
0.5–1 million	29	19.36	20.58
0.3–0.5 million	30	10.90	17.74
0.1–0.3 million	150	23.46	18.12
50,000–100,000	275	18.55	12.16
Below 50,000	2,866	45.09	10.04
<hr/>			
All classes	3,362	159.39	18.75

Source: National Buildings Organization: Handbook of Housing Statistics 1981, New Delhi p.32 (Reproduced from 'Health and Basic Amenities for the Urban Poor' by Shiva Ramu S. in "On Growing Needs of Urban Health Management" 1986, *op. cit*).

EXHIBIT 3
S.C./S.T. Population in Slums

<i>City</i>	<i>S.C./S.T Population in slums as % of Total S.C S.T Population in city</i>	<i>S.C/S.T Population in slums as % of Total Population in slums</i>
Ahmedabad	28	20
Baroda	55	32
Surat	50	31
Nadiad	99	52
Rajkot	14	8
Jamnagar	99	26
Bhavnagar	99	45

Source: Slums in Gujarat, Operations Research Group, Baroda.

EXHIBIT 4
Illiteracy in Slum Population

<i>City</i>	<i>% illiterate</i>
Bombay (Slum-1) ⁶	39
Bombay (Slum-2) ⁷	24
Bangalore ³	54
Gulbarga ⁵	69
Ahmedabad ²	59
Baroda ²	56
Surat ²	54
Nadiad ²	63
Rajkot ²	69
Jamnagar ²	59
Bhavnagar ⁶	59
Madras ⁸	68

Source: References cited in the text.

EXHIBIT 5

Some Characteristics of Slum Areas of Class I Cities

(in percentage)

<i>City Group</i>	<i>10 lakhs & above</i>	<i>3-5 lakhs</i>	<i>1-3 lakhs</i>	<i>All India</i>
A. Ownership of house				
— Owned	42.47	50.74	54.12	48.20
— Neither owned nor rented	8.88	6.20	8.61	7.96
— Rented	48.65	43.06	37.27	43.92
B. Wall				
— <i>Kutcha</i>	33.17	54.75	59.35	46.82
— <i>Semi pucca</i>	17.46	7.95	8.96	12.33
— <i>pucca</i>	49.37	37.30	31.69	40.95
C. Roof				
— <i>Kutcha</i>	25.56	30.33	37.49	30.18
— <i>Semi pucca</i>	52.23	52.62	52.23	52.35
— <i>Pucca</i>	22.21	17.05	10.28	17.47
D. Drinking Water				
— Tap and Tubewell	93.40	79.01	78.96	84.74
— Others	6.56	20.99	21.04	15.26
E. Latrine Facility				
— Separate latrine				
a. Sanitary	5.18	2.32	2.54	3.59
b. Others	3.02	6.46	7.50	5.28
— No separate latrine	91.80	91.22	89.96	91.13

F. Underground Sewerage System

— Yes	45.18	10.13	3.78	22.38
— No	54.82	89.87	96.22	77.62

G. Waterlogging during monsoon

— Yes	33.65	48.31	47.53	42.27
— No	66.34	51.69	52.47	57.73

Source: National Building Orgn. — Handbook of Housing Statistics, 1981 New Delhi (from various tables). (Reproduced from “Health and Basic Amenities for the Urban Poor” by Shiva Ramu S. in “On Growing Needs of Urban Health Management”).

EXHIBIT 6

Morbidity Pattern of Population According
to their Housing Condition

<i>Diseases</i>	<i>% Sick persons in housing condition</i>			
	<i>% Good</i>	<i>% Satisfactory</i>	<i>% Poor</i>	<i>% Overall</i>
Infective & Parasitic	9.1	12.2	17.6	15.5
Endocrine, nutritional and metabolic	10.9	1.2	3.6	2.9
Blood and blood forming organs	—	0.9	1.6	1.3
Mental disorders	1.8	0.5	0.5	0.5
Nervous system & sense organs	3.6	3.6	2.3	2.7
Circulatory	9.1	0.2	0.2	0.4
Respiratory	5.5	5.5	6.6	6.2
Digestive	10.9	5.3	4.4	4.8
Genito-urinary	1.8	1.2	1.3	1.3
Complications of pregnancy, child birth and puerperium	—	0.3	0.3	0.3
Skin and subcutaneous tissue	—	3.1	4.4	3.9
Musculo-skeletal	10.9	3.2	2.5	2.9
Ill-defined	3.6	1.3	1.1	1.2
External causes	1.8	0.2	0.2	0.2

Source: Garg *et al* 1983 *op. cit.*

EXHIBIT 7

Percentage Distribution of Deaths in the Service Area
of Urban Health Centre, Chetla, 1986

Cause of death	Age (Years)					Over- all
	Below 1	1-4	5-14	15-49	50+	
Prematurity	20.8	20.8	—	—	—	0.2
Post-natal asphyxia	2.1	—	—	—	—	0.2
Malnutrition rickets and marasmas	6.3	8.3	—	1.1	0.6	2.2
Anaemia	—	—	6.6	3.1	1.3	1.6
Septicamia	10.4	—	6.7	2.1	—	1.6
Encephalitis	—	8.3	6.6	1.0	1.0	1.4
Meningitis (All forms)	4.2	12.5	13.3	4.1	—	2.2
Asthma	2.1	—	—	2.1	6.1	4.4
Tetanus	—	—	6.7	—	—	0.2
Measles	—	—	—	—	—	—
Malaria	—	—	6.7	—	3.0	0.4
Diphtheria	—	—	—	—	—	—
Tuberculosis (All types)	—	4.2	—	12.2	3.2	4.6
Cirrhosis of liver hepatitis & coma	—	—	—	6.1	3.5	3.4
Malignant neoplasms	—	—	—	5.1	8.7	6.5
Cerebral haemorrhage and thrombosis	—	—	—	4.1	15.5	10.6
Heart diseases including hypertension	—	—	6.7	12.2	25.8	18.8
Dysentry, diarrhoea, gastroenteritis & colitis	22.9	10.8	6.7	7.1	4.5	7.7

Slums in India

Cause of death	Age (Years)					Over- all
	Below 1	1-4	5-14	15-49	50+	
Pneumonia, bronchitis and broncho-pneumonia	27.0	33.4	20.0	4.1	6.8	9.9
Enteric fever	—	4.2	—	—	—	0.2
Rabies	—	—	6.7	—	—	0.2
Causes not known	2.1	—	13.3	17.3	2.6	5.7
Others	—	8.3	—	15.3	20.0	16.2
Total	100.00	100.00	100.00	100.00	100.00	100.00

Source: Annual Report 1988, All India Institute of Hygiene and Public Health, Calcutta.

EXHIBIT 8

The Mysore Slum Areas (Improvement and Clearance) Act, 1958

This Act provides for the improvement and clearance of slum areas in the State of Mysore and for the protection of tenants in such cases from eviction.

The substantive sections of the Act deal with:

Declaration of slum areas based on considerations of fitness for human habitation and safety in terms of repair, stability, freedom from damp, natural light and air, water supply, drainage and sanitary conveniences, storage preparation cooking of food and disposal of wastes.

Power of competent authority to require improvement of buildings unfit for human habitation.

Enforcement of notice requiring execution of works of improvement.

Expenses of maintenance of works of improvement etc.

Power of competent authority to order demolition of buildings unfit for human habitation.

Procedure for demolition

Power to declare any slum area to be a clearance area.

Slum clearance order.

Power of competent authority to redevelop clearance area.

Other aspects covered in the Act are acquisition of land, protection of evicted tenants, etc.

EXHIBIT 9

National Slum Clearance and Improvement Act 1956

Under this legislation, slum clearance schemes were taken up in several cities. The state governments were authorised to provide the following facilities to families with income of Rs. 250, or less (Bombay) or Rs. 175 (Other places).

- Open developed plots (1200 sq.ft/family) at Rs. 2,100 maximum, rent Rs. 5 or 6 p.m.
- Skeletal housing (cost about Rs. 3,200) rent Rs. 9–11 p.m.
- *pucca* houses (232 sq.ft.) at Rs. 5000–6000, rent Rs. 14–22 p.m.
- night shelters (30 sq.ft/person) with some essential facilities.
- dormitories at a cost of about Rs. 800/person and 58 sq.ft/person.

Central subsidy: 37.5 per cent.

Source: Ramachandran P. in A.R. Desai and S. Devadas Pillai, *op. cit* 1970.

EXHIBIT 10

Achievements of Karnataka Slum Clearance Board

1.	Total population of the State (1981 Census)	.. 3, 71, 35, 714
	a) Total Urban Population of the State (1981 census)	.. 1, 07, 29, 606
	b) Total rural population (1981 census)	.. 2, 64, 06, 108
2.	Total slum population of the State (estimated)	
	a) Total number of slums	965 Nos.
	b) Total slum population (estimated)	9, 22, 168
3.	Percentage of slum population to the total urban population of the state	8.6%
4.	Total population of Bangalore City (1981 census)	29, 21, 751
5.	Total slum population of Bangalore city	
	(a) Total number of slums	400 Nos.
	(b) Total slum population (estimated)	3, 05, 926
	(c) Percentage of Bangalore slum population to the total city population	10.5%
6.	a) Total slum population benefited under slum improvement in the State	5, 26, 135
	b) Percentage coverage of population to the total slum population	57.0%
7.	a) Total EWS houses constructed under slum clearance scheme	4 194
	b) No. of slums covered under this scheme	36 Nos..

Slums in India

8.	<i>Total slums covered in the State</i>	
a)	Under slum improvement programme	615 Nos.
b)	Under slum clearance scheme	36 Nos.
	Total	<u>651</u>
c)	Percentage of slums covered to the total identified slums	67%
9.	<i>Bangalore City</i>	
a)	Slum population covered under slum improvement scheme in Bangalore City	1, 03, 257
b)	Percentage of slum population covered to the total city population	33.7%
10.	a) Total EWS houses constructed in city under slum clearance scheme	1,496 Nos.
	b) No. of slums covered under the scheme	9 Nos.
11.	<i>Total slums covered in Bangalore City</i>	
a)	Under slum improvement programme	92 Nos.
b)	Under slum clearance scheme	9 Nos.
	Total ..	<u>101 Nos.</u>
c)	Percentage of slums covered to the total slums in the city	60%

Source: Karnataka Slum Clearance Board: Functions and Achievements 1975–86.

EXHIBIT 11

Extract from National Housing Policy (Informal Sector Housing and Slums)

A sizeable proportion of the urban population have inadequate housing. Many of them have to take shelter in slums and squatter settlements. Many of them also earn their livelihood in the informal sector. To tackle the multifaceted problem of housing for this section of the population, the strategy will include:

- a) stepping up programmes for the environmental improvement of slums through the provision of a minimum level of basic services like potable water, sanitation, drainage, street-lighting and paved pathways;
- b) conferring tenurial rights, at reasonable rates, on slum dwellers, as per approved norms, in respect of land occupied by them, wherever possible;
- c) re-locating slum dwellers and squatters, to the extent possible, wherever conferment of tenurial rights in respect of the land occupied by them is not feasible
- d) assembling and allocating land for making available sites-and-services;
- e) providing easy access to institutional finance for upgradation or redevelopment of their dwelling units;
- f) promoting savings schemes for housing;
- g) involving the slum dwellers in slum improvement and upgradation programmes by adopting a self-help and community approach in the maintenance and improvement of their settlements;
- h) facilitating the formation of cooperatives and other associations at the local level and developing managerial skills of individuals and households to promote access to services and amenities provided by public agencies and local authorities;
- i) modifying planning standards and building regulations, *inter alia*, have a *Semi-pucca* house recognized as an acceptable dwelling unit by local authorities;
- j) disseminating information regarding low-cost building

- materials and construction techniques;
 - k) providing non-formal training for facilitating the maintenance and improvement of dwelling units on self-help basis;
 - l) opening of supply outlets for the sale of building materials at reasonable prices;
 - m) promoting low-cost water supply and sanitation;
 - n) promoting the use of smokeless *chulhas* and renewable sources of energy;
 - o) promoting activities to enhance incomes of households to facilitate, *inter alia*, home improvement; and
 - p) removing obstacles to women's access to credit and title to land.
-

Source: National Housing Policy, 1988 (Government of India).

EXHIBIT 12

Health Principles of Housing (Summary)

- | | |
|------------------|---|
| Principle No. 1 | Protection against communicable diseases. |
| Principle No. 2 | Protection against injuries, poisonings and chronic diseases. |
| Principle No. 3 | Reducing psychological and social stresses to a minimum. |
| Principle No. 4 | Improving the housing environment. |
| Principle No. 5 | Making informed use of housing |
| Principle No. 6 | Protecting populations at special risk. |
| Principle No. 7 | Health Advocacy. |
| Principle No. 8 | Economic and social policies. |
| Principle No. 9 | Intersectoral action for development planning and management. |
| Principle No. 10 | Education on healthy housing. |
| Principle No. 11 | Community cooperation and self-help. |

Source: Health Principles of Housing, WHO, Geneva, 1989.

THE URBAN POOR : CASE OF SRI LANKA

INTRODUCTION

Policies formulated at the national level impart effects both within as well as outside the expected domains. Policies that are designed to enhance the performance of one productive sector impart effects to other sectors. As a result changes occur in the relative benefits and rewards for the participants within the respective productive sectors. For example, pricing policy designed to increase food production may adversely affect the wage earning groups in the urban sector, especially the urban poor depending on casual employment. This in turn would impact on the nutritional status of poor households and consequently their health. There are a range of policies starting from the macro dimension to specific sector policies, that have health-related impacts and consequences on certain population groups.

Urban development policy affects the quality of the habitat of specific urban households. In Sri Lanka, large majority of the urban households in the metropolitan area of Colombo live in habitats which are seriously deficient in basic amenities. The habitat exposes these households to health risks and vulnerabilities arising from the structure of the home, the crowded living conditions, the neighbourhood of the home and the water supply and toilet facilities available to them. Many squatters are located by the side of canals that transport effluents from factories. Although the policy framework has been put in place by the Central Environmental Authority, checking and

This case study was prepared by Nirmal Gunatilleke, Marga Institute, Colombo. It is intended as a basis for discussion rather than to illustrate either effective or ineffective handling of an administrative situation. Funds for its preparation were provided by a grant from WHO. Case III.3.

policing is not as efficient as it must be. State interventions to grant better access to urban building sites, to improve the water and sanitation services to the sites, can reduce the risks of the poor quality of the living environment.

This case study attempts to develop the analytical tools to identify the links between selected policies and health outcomes of the urban poor. The urban poor is first identified and the characteristics of the group selected for the exercise are indicated. The analytical framework is then developed and the set of policies for examination specified. The method is applied conceptually to 2 cases. Finally, the conclusions are presented.

In 1981, approximately 22% of the population of Sri Lanka lived in urban areas and nearly half of them were in Metropolitan Colombo. The population of the city of Colombo is expected to have reached approximately 650,000 persons by 1989. The density within the city would be 45,000 persons per square mile. Nearly half the city's population is estimated to be living in congested, poorly serviced, substandard or low-quality housing.

THE URBAN POOR : PREVAILING SITUATION

In this exercise we define the urban poor in the following manner:

Those households and individuals comprising the households that are located in a habitat of low quality or low standard housing and housing-related services, including water and sanitation, waste disposal and surface water drainage.

Data for Sri Lanka indicate that all households in these habitats are not poor in income. However, even the households which are not poor in income live in habitats or settlements which are seriously deficient in many respects. A large proportion of the homes in these settlements have poor quality floor, wall and roof material. The water supply and sanitation is mostly communal and inadequate to meet the needs of the households. Housing of poor structural quality is common to the rural sector as well. However, crowding and problems associated with waste disposal create higher risk of contamination of water supply and food; higher risk of the spread of and exposure to, particular types of infection, is especially to the urban poor.

The low quality structures are homes for approximately half the population of the city of Colombo. They are dispersed in small pockets

and have the additional characteristics that produce health hazards and make the household vulnerable to disease and ill-health. These characteristics include the proximity to open drains and canals which remain stagnant and polluted, garbage dumps and sites for commercial and industrial waste disposal. Therefore the group that is chosen for this policy interaction and identification of links is defined partly by the characteristics of their habitat. See table below:

Characteristics of the Urban Housing Stock 1981

Housing Stock

Total Urban	509,459
Colombo City	84,530
Proportion of Slums & Shanties	53%

<i>Urban Housing Structural features</i>	<i>% of total Urban Stock</i>
--	-------------------------------

Permanent	46.5
Semi-permanent	27.7
Improvised	7.6
Palm Thatch or metal sheets	35.3
Mud or Wooden Walls	31.6
Mud or Earth Floors	18.8
Clay Brick Walls	67.7

Amenities

Without formal toilets	16.4
Piped Water (including Standpipes)	46.5

Source: Housing Development in Sri Lanka : 1971–1981, Marga Institute. Tisara Press 1986 p.51 Table 2 and Department of Census & Statistics, Census of Population of Sri Lanka 1961, Housing Tables Preliminary Release No. 2.

The household income and purchasing power is expected to be a major factor in determining the choice of a place to live. However, the location has features that individual households cannot easily change. The communal water supply and toilet services available to a large proportion of the urban poor cannot be improved by individual

initiative for private use. In some settings lack of space precludes the development of private toilets. In others accessing State-provided services such as the water supply, sewage system or the electrical power grid is not possible due to legal and administrative constraints. The transaction costs of obtaining connections are very high and income alone is not adequate to access basic services. Concerted state interventions are needed to overcome the legal and operational impediments. See table below:

*Indicators of Poverty in the Urban Sector
1985-86*

1.	Per capita Requirements of Calories	2,018
2.	Per capita Expenditure required to achieve the minimum calorie and protein requirement	Rs. 233
	National Average	Rs. 202
3.	Households below Poverty Line	203,473
	Percentage	32.8
	National Percentage	44.8
4.	Percentage of <i>Ultra Poor</i>	3.2
	National Average (Percentage)	2.9
5.	Percentage <i>Nutritionally at Risk</i>	23.9
	National Average (Percentage)	22.4
6.	Percentage of Households Not achieving minimum calories	53.8
	National Average (Percentage)	49.2

Source: Department of Census and Statistics. Income Distribution and Poverty in Sri Lanka, 1987.

Most squatter settlements are “tolerated” by the municipal authorities. Some form of regularization occurs over time. Tenure or title is not granted but official recognition takes the form of State-provided basic services, communal toilets, and communal water taps. The lack of title is a disincentive to home improvement, upgrading or building permanent structures. The inability to develop private water supply and toilet services or to improve services through private effort affects the type of structure that households construct. The rate of upgrading is expected to be positively correlated with the quality of the basic services available to the home. Most households tend to desire improvements in water and sanitation services. If they can be improved, homes tend to be upgraded faster. The impediments to the improvements in these services will constrain home improvement and upgrading.

The proximate habitat of the urban poor household can be characterized by the following features:

The home is crowded, built with significant use of non-durable material.

During the time that meals are cooked, many homes are filled with smoke and soot because of the use of firewood inside poorly ventilated homes.

A large proportion have no access to toilet facilities.

The majority of the poor urban households use common toilets which are overused and poorly maintained.

The water supply available to most poor households is a communal tap shared often by as many as 40 households (serving 200 or more persons). Water is collected daily and periods of over 1 hour are spent by many households waiting their turn at the standpipe.

The vicinity of the settlement is often poorly maintained. Surface drainage is poor. Many squatter settlements are located near polluted and stagnant canals. Waste disposal is poorly organised or not at all. Often there are large garbage dump sites in the immediate neighbourhood of the settlement. The flow of motor traffic in the vicinity adds to the noise, exhaust fumes and risk of accident.

THE ANALYTICAL FRAMEWORK

THE POLICY VARIABLES

The following groups of policies will be considered:

I. MACRO ECONOMIC

(i) *Fiscal Policy*

Government Expenditure

Social Welfare programmes relating to minimum standard of living, food stamps and changes in eligibility criteria, non-indexation of the value of the food stamp

Subsidy policies: Sectoral, — Agriculture, Industry.

Government Revenue

Pricing of basic goods acquired by the State, imports as in the case of consumer goods, flour, medicine, inputs for production of food and other commodities, fuel.

Taxation of production and distribution.

(ii) *Monetary Policy:*

General level of interest rates and price of credit. Tight or loose money.

(iii) *Trade Policies*

International trade. Tariff, exchange rates. Internal trade regulated by taxes and fees.

II. SECTORAL POLICIES AT THE MACRO AND SUB-NATIONAL LEVEL

(iv) Sectoral policies directed at productive sector.

Agriculture, industry, Social overhead sector, housing, education, health, transport.

Policies which aim to affect access either through the price system or through changes in supply, (as in expanding the school system, medical services) etc.

Urban development, access to habitat.

The policies indicated above have independent as well as interdependent effects, outcomes and impacts on the special group considered

here i.e. the urban poor.

In addition to the above, the effects of international economic activity are transmitted to the national and sub-national levels. These are not the result of policy enacted at the national level. For example, the adverse movement of the exchange rate will transmit effects through prices for imported food items, intermediates such as agricultural inputs, fuel, and pharmaceuticals. Price increases in these important imports are generated by forces outside the national economy and not subject to its control. Policy is designed to either transmit effects directly to different groups or to absorb some of the effects through the government budget.

Therefore the economic management and its capacity to respond to changes in the international economy is of vital importance to the well-being of the poor and the vulnerable.

The policies that will be considered in the discussion can be identified in terms of:

- National responses to the international economy; for example, price fluctuations of imports and exports.

- Aims and objectives; the sector within which policy is cast, the sector(s) which it expects to affect.

- Direct and indirect impact on different types of households; these include the impact on aspects of well-being of the household, its capacity to consume defined by income, the effect on demand through changes in relative prices of basic goods and services.

The policies have been described in general terms without mention of scale, size of impact. Each category and type of policy has potential to affect the urban poor.

The policy is identified in terms of the impact channel and decomposed into effects on the household. The vulnerability and exposure to risk is assessed in terms of nutritional status and potential for illness. A net outcome in terms of health risk and exposure can be evaluated. Since the environmental features and vulnerabilities are known beforehand, the policy needs to be assessed in terms of the possible degree and strength of the risk and exposure outcomes resulting from the policy. The vulnerability and changes resulting from policy can be examined in terms of special groups within the household, the infants, children, pregnant and lactating women, the sick and the aged. The possible duration of the impact or effects,

whether they are long or short-lived can also be specified and the transitional impacts identified.

2. Policy Impact Channels Market and State determined:

Purchasing Power affected by: Wages, Profits, Income, transfers and relative prices, especially, self employment and casual wage incomes.

Access to services. Changes in the delivery and pricing of housing and health services, transport and educational services, the latter affecting the processing of information related to opportunities for improvements in income and material well-being, nutrition choice, reproductive behaviour and family size.

The balance between state and private sector provision. Changes in the prices of services. Health, education and transportation.

Trade policy effects on import and export opportunities. Import substituting or export promoting will affect urban poor, especially the small scale traders. Effects through earnings and consumption.

Exchange rates, changes in relative prices of domestic and imported items, changed availability of food.

Interest rates, income savings and assets, affected directly by monetary policy, by the policies above, special schemes discriminating in favour of small-scale, export production, sector or geographical region.

Institutional rigidities, traditional modes of behaviour and cultural practice will tend to modify the impact and effect of policy.

3. *Duration of the effects of Policy:*

Depending on the type, scope and scale of the policy, its effects will be felt over a time period which is short, medium or long. Some policies will have temporary effects while others will be lasting or long-lived in effect.

4. *The bundle of Basic Goods:*

The impact of policy and decision-making can be examined by identifying a bundle of basic goods and services purchased by the poor. This basic bundle will consist of the following:

Food: almost exclusively market purchased; domestically produced cereal, rice, imported wheat flour and flour-based

products produced in the neighbourhood or the vicinity, vegetables (often the medium to low grade quality), small quantities of dried and fresh fish, coconuts, sugar (primarily imported), milk powder (quantity depending on the composition of the household).

Housing Services: location, squatter settlement, slum or crowded tenement setting, small proportion in small sector apartments. Water and toilet services (communal, over-extended and usually in poor maintenance).

Clothing: The requirements in the urban sector are expected to be higher. The poorest will tend not to have a regular change of clothing.

Health Care Services: State sector clinics, and central hospitals, many private hospitals and clinics; access depending on income in the case of the private sector service. Growing community health volunteer system supported by the state sector personnel, but in very small scale at present. Maternal health care with supplementary feeding programmes.

Education and Transport: Access to the education system depends on location. The urban poor are generally strategically placed to access schools that are superior to those of the average rural sector child. Supplementary feeding programmes at school.

5. *The Interaction between the environment and economic capacity:*

The urban poor are defined by both access to habitat as well as capacity for material well-being. Income and consumption levels dominate the definition. However, a semi-independent aspect that must be considered is derived from the specific characteristics of the environment. All urban poor are not confined to low quality living environments, and not all in such settings are poor in income. However, the environment is expected to impart vulnerabilities especially in the form of exposure to ill-health or illness causing situations.

The urban development policies relating to physical planning are therefore independently important. Low income and the vulnerability it imparts to a household in terms of impaired nutrition and health status may be magnified or reduced by the type of environment. For example, housing that keeps away the damp, is properly ventilated, and is serviced by safe drinking water and toilet

facilities will not reinforce the detrimental effects of inadequate nutrition resulting from low income. The household in such housing will not be exposed to environmentally generated health risks in addition to the vulnerability resulting from the low income level. Furthermore if the disposal of waste is efficient and the neighbourhood is free from disease vector production, the reinforcing effects of health risks are reduced.

The urban poor are considered in terms of "natural" units, the households. The policies and their effects are then translated into changes in the capacity of households, their purchasing power and access to basic goods and services. The basic goods and services are defined directly: food and nutrition, shelter and housing services, clothing, educational services and health services. The health effects of the policies are then derived as direct or indirect effects.

Nutritional changes are expected if relative prices of major food items change without offsetting changes in income. For example, if wheat flour price increases without offsetting changes in cereal prices or incomes, the policy or decision that results in a wheat price increase will affect the nutritional status of poor households depending on the size of the price increase. If large enough to result in a decline in the calorie availability of the households, it will tend to expose it to health risks. The effects will be larger if the household is simultaneously vulnerable or exposed to illness through the habitat and housing service. Offsetting effects may be generated if additional income earning opportunities are available without resulting in a net additional vulnerability. Some members of the household may be temporarily exposed to health risk during the period of adjustment to higher prices as new avenues of income are sought.

International price effects are transmitted to the domestic economy through trade. The manner in which these effects are internalized depends on the policy regimes that operate. The price effects may be transmitted to all consumers in a regressive manner (because of the inherent inequality of income) or modified by the application of discriminatory pricing and access according to economic strength. The latter is achieved through a social welfare system or a rationing system. The costs are absorbed and distributed through inflation or reduced availability of other goods and services. The effects of increased national costs of imported goods, depending on the size of the increase, will lead to economic consequences that impact on the general price level, interest rates, savings and real incomes. Fixed

nominal income and wage earners will tend to experience hardship. The poor with a larger proportion of income devoted to food would be more affected than others. However, the urban poor will be at a greater disadvantage as they do not produce food and depend on exchange. The reduced availability in general would lower household food consumption among the urban poor. Nutrition of the vulnerable would be impaired and the risk of ill health increased.

6. *Characteristics of the Urban Poor:*

The urban poor household has dimensions of poverty that are different from those of rural poor households. The urban poor are in the proximity of a range of services which reduce the effects of income related risks and vulnerabilities. Health, education and transport services are more readily available. However, changes in the prices or the provision of these services impact strongly on the poor urban household. The poor urban household will tend to have a large proportion of members at the two ends of the earnings cycle. Young households at the formative stage of the family and old ones where the household head is not able to contribute income will be in this category. The poor urban household faces an economic situation where market-based transactions dominate. Almost all of the household needs have to be purchased. Policies that affect the availability and the prices of food items will affect the urban poor strongly. Items such as wheat flour are important in the diet of the urban poor household. A range of policies and internationally transmitted effects tend to raise the price of this commodity. Policies and transmitted effects, leading to inflation will adversely affect the real incomes and purchasing power of the urban poor.

Within this framework the household is considered as having the following characteristics:

Internal:

Demography and composition,
Education, skill and training,
Economic Resources, incomes
Assets convertible to purchasing
power, savings, goods,

External:

Habitat, the location and the services that the household can access. Some characteristics of the habitat can be changed

through purchase, these include the physical structure and its attributes and the services to the home. The location can be changed, but it is more difficult and mobility is low in Sri Lanka. The socio-economic context, economic supports, income levels, prices of basic goods and quality of social infrastructure.

The poor urban household is characterized by the insignificant contribution of agricultural goods produced by the household. Exchange through purchase predominates.

The household is constrained by both the internal as well as the external factors. The poor urban household is vulnerable to fluctuation in income and purchasing power and is exposed to health risks from the location it is able to select. The location provides access to employment and a range of other services including, health, education and transport. The choice of location is constrained by the available opportunities to generate income. Additional health risks are generated by a range of income generating activities at home. They produce hazards of fire, or heat and may expose children to potentially dangerous substances (e.g. kerosene in the case of small stores).

7. Feature of the Habitat Accessed by the Urban Poor:

The habitats that the poor can access within the urban setting have a range of negative characteristics. These include:

- poor water supply, low quality sanitation and waste disposal,
- poor drainage and protection from floor,
- congested or overcrowded neighbourhood,
- exposure to industrial waste, heavy motor traffic.

The habitat is also associated with access to specific types of employment and income generating opportunities. For the poor, the neighbourhood is very important for generating employment and income. They access the localized casual employment markets, the self-employed locate themselves in the proximity of the perceived market for their services or produce. The neighbourhood is therefore a vital part of economic resource of the poor household. The localized pools of opportunity are not the only income generating opportunities available or accessed by the urban poor. Transport affords access to other markets and opportunities. Some commute to other parts of the city for regular wage labour, but locate themselves according to convenience and the cost of housing. Decisions about location are affected by prospects of ownership of housing within the urban sector,

and this in turn depends on the action of the State. Significantly large proportion of poor households in the urban sector generate income from home-based activities. Small workshops, stores and food preparation enterprises are common. These add to the hazards and risks already present in the habitat.

A large proportion of the urban households cook their meals inside the main structure of the home. In the tenements, most do not have a separate area for cooking. In such settings many use fuel wood and the homes are smoke-filled during cooking time. In the shanties and the squatter settlements, most households use kerosene for lighting. The lamps used are often improvised from bottles and susceptible to tipping over and spreading fire. The structures contain inflammable material, wood for the walls and coconut palm thatch for the roof. The proximity of other homes increases the risk of fire and smoke to the entire community.

8. *Analysis of Policy Impacts:*

The analysis of policy and the health impacts can be considered in the light of the relationships that have been outlined. The framework is as follows:

Poor urban households with internal characteristics defined by demography (household size and composition), education and human capital attributes, income and purchasing power (which have features of stability and vulnerability), and placed within a socio-economic context defined by State assistance and provision of goods and services. Availability of goods and services and ease of access, determined by prices and transaction costs, a social security and welfare system.

An economy with particular structural features and vulnerabilities, open (in terms of trade), dependent on export earnings to finance a range of basic consumer items including wheat, milk power, sugar, intermediate products such as agro-inputs and crude oil for the production of fuel.

The effect of decision making and international fluctuations on the bundle of basic goods and services defined earlier is considered.

The nature of the impact depends on the strength of the price increase that is transmitted to the domestic economy and the urban poor in particular. Mitigating effects such as food security systems and income supports play a part if they exist.

The impact of sectoral policies in food and agriculture, services such as health, transport and education can be examined within a similar framework. However, the manner in which the policy effects are transmitted are not the same in all cases. Two different aspects have to be considered. First, the policy transmission mechanism. The policy variables that are affected, the target variables to be affected and the transmission mechanism that operates, will differ according to the policy. The policy impact will have different duration and strength. Some effects would be temporary and adjustments will occur, while in other cases the impacts will be long lasting. Access to services such as education have impacts that are in general long lasting. Neither are the effects immediate. Transport cost increase will increase the cost of access to basic services in education and health as well as the cost of generating income. Incomes may be bargained up in time but with a definite lag. In the unorganized sector, wage and income increases may be slower to adjust to the cost increase. Some of the effects, as in the case of nutrition impairment through reduced food intake as a result of price increases, will have inter-generational effects. Nutritionally impaired children and relatively uneducated men and women will result from policies and decisions taken at present. This will reduce the potential of some of the individuals to fully participate in the system in the future. Poverty and ill-health are transmitted through reduced access to education and information processing capacity.

Therefore the national, sub-national and sectoral policies will affect the urban poor in the following manner:

Agriculture and Food and Nutritional policies through food availability and the cost of nutrition.

Social Welfare policies, subsidies and income supports, supplementary income and guaranteed consumption. Health services directly through provision as well as through transaction costs in the form of transport.

The costs of medication and pharmaceuticals.

Community health and services, community-based interventions, State-provided or assisted.

Policies related to the regulation of access to habitat and amenities such as water service and sanitation.

Management of the macro economy and policies of adjustment

at the national level lead to higher food, fuel and transport prices and result in increases in the cost of living.

The transmission of effects are through food and nutrition availability and prices. The impact of external factors and their management will affect the urban poor through their food budget and through higher fuel costs. The higher fuel costs will tend to impact on domestic food items transported to the urban areas as well as the cost of preparing food with the use of kerosene. Meanwhile the cost of generating income will increase if fuel costs are transmitted as higher transport fares. The control of transport prices depends on whether government policy will absorb the cost or subsidize the private passenger and goods transport sector through tax policies or permit the transmission of input costs as higher service charges. The latter would affect the incomes and real purchasing power of the urban poor. A set of policies related to social welfare, and the major productive sectors of the economy, the social infrastructure and the urban living environment can be decomposed into processes and impacts on the urban poor. The health consequences are deduced from the impacts.

APPLICATION OF THE METHOD

CONTEXT : METROPOLITAN CENTRE OF COLOMBO, SRI LANKA:

The metropolitan habitat can be divided into two major parts. One consists of the locations which have tenurial forms, are legal and where transfer rights accrue to owners. These are habitats of the middle and upper income households and some of the lower income households. Among these habitats are those which the urban poor occupy, the slums and the congested tenements. Most have legal tenure in the slums and tenements but the form is not adequate to place the properties as collateral to formal financial institutions.

The other consists of the squatters and illegal occupants of land in the city and its outskirts. The state does not provide ownership rights in the manner of outright purchase to the squatters. But some form of official recognition is made by the authorities, ground rents charged in many instances.

The poor quality urban habitat has two components, one consisting of run down and overcrowded tenements or small row houses and slums in the city center and the other, the squatter settlements where

semi-permanent homes serviced by highly overloaded water supply and toilet facilities are the norm. The squatter habitats are also likely to be congested and in settings associated with additional health risks such as polluted canals and large storm water drainage areas liable to flood and rail line reservations. Sri Lanka does not have very large squatter settings as in other developing countries of the region. The urban poor are dispersed over the city and its outskirts. The dispersion is a function of untended public lands that are available for squatting. The locations that are chosen depend on the functioning of local networks. The choice of location is expected to be closely tied to employment and the origin of the household head or the spouse.

The urban development policy of the past decade has taken steps to enhance the delivery of basic services to most of the tenements and slum habitats in Colombo. Resettlement of squatters is a small but important part of the policy. Meanwhile, in the city center, congested tenements are being slowly replaced by apartments in a programmed manner. Evictions from squatter areas seldom take place, the provision of basic amenities, communal facilities for water and toilet services, is the first step towards State recognition and consolidation of the habitat. Nevertheless there are many squatter settlements that have not received State assistance for basic services for more than a decade.

CASE I. RECONSTITUTED URBAN HABITAT FOR THE POOR

The concepts developed in the preceding discussion are applied to the situation of an urban habitat that has received the direct intervention of the government through its housing development programme (the Urban Component of the Million Houses Programme). Approximately 100 households from a poor quality neighbourhood, are relocated on a prepared site, blocked out and serviced with amenities including water supply, toilet and waste disposal and a community center. The beneficiaries were provided with financial assistance to build permanent homes. Subsidized loans that were adequate to build a core house were provided. The homes were serviced with common piped water supply and toilets.

The households had been living in the vicinity in homes that were mostly constructed in a makeshift manner. While the majority had cement floors, they had started off with damp earth flooring. A significant proportion of the households had been without formal toilets, others use communal facilities that are most often overused

and poorly maintained. The water supply and the toilet service had been seriously strained. The area was subject to flooding during the rainy season and the nearby canal was clogged and stagnant most often. The households functioned as a community which tended to cooperate for some types of collective action. Not much had been done to improve the habitat through collective action. Mutual aid and assistance was provided in an organized manner at critical times such as serious illness, birth or death. Organized income generation within the community tended to be outside the law. Individual enterprise was present. Most households derived incomes from irregular wage labour or tasks associated with trade. A few were in government sector salaried employment. The community consisted of a mixture of the different ethnic groups. The minority representation was higher than the national average.

The move to the new setting was accompanied by additional financial burdens. The households were exposed to two competing forces. The loan obligation required a regular stream of savings to be generated. Meanwhile the completion of the home required additional financial obligations for many. Furthermore there seems to have been a tendency for the authorities to urge and press for early completion of the homes. During the period of construction, some beneficiaries seemed to have sold their plots illegally, realizing the high commercial value of the site. The completion of the home became a high priority and it promised the potential of new sources of income from illegal subletting or small-scale economic activities in the home. The latter opportunity especially in preparation of food for nearby factory and government office employees, was enhanced by the prospect of a better quality of neighbourhood.

The site had been prepared, waste disposal and surface drainage planned. However, the canal that bordered the site, remained in virtually unchanged conditions. The communal toilets and water supply required a system of maintenance. The settlers were not quite in a position to undertake the maintenance and upkeep on their own. The community development council (CDC), that had been formed when the settlement began did not have a financial base to undertake activities of this sort. Moreover these activities remained under the control of the branch of the government agency that completed the project. The transition to a self managed settlement was slow.

This type of intervention in the urban sector is relatively small and new in the form described above. The urban habitat in Metropolitan

Colombo is characterized by the very poor living conditions available to approximately one half of the urban population. State sector interventions in the form of apartments for the low income and improvements of amenities in settlements has taken place on an expanded scale since 1977. Squatters and illegal occupants of State lands comprise the major portion of the urban poor households.

CASE II: AN ILLEGAL SQUATTER SETTLEMENT

Approximately 100 households, makeshift homes, many with wattle and daub walls, thatch or corrugated metal sheets for roofing.

Congested setting, access paths not well prepared.

Communal water supply and sanitation seriously over-extended.

Most persons are employed as casual labourers or in small-scale enterprise. A few are engaged in State sector wage employment.

This squatter site is located in the vicinity of a State developed apartment complex for the urban middle class. Facing the community is an upper-income and middle-income residential neighbourhood.

The squatters have been at this site for approximately 20 years. The State has indicated that the households will be relocated but no action seems to have been taken yet. The land occupied by the squatters has high commercial value for upper income residential dwellings.

The two communities are now exposed to a set of policy measures and the likely transmissions and outcomes related to health or the implications for health are traced.

State interventions and policy reach the urban poor in the following manner:

Income: Casual labour, trade and small enterprise.

Prices: Inputs to small business affecting profits and income.

The bundle of basic goods consumed by the poor is dominated by food. The food bundle consists of items locally produced, rice and vegetables, milk (processed) and protein items. Imported wheat flour, and a small proportion of imported foods complete the food basket. Tobacco and beverages are locally produced or processed and consumed in relatively large quantities by the urban poor

males.

The services available to the urban poor: Housing and related services. The State grants access to locations or sites, provides basic services to squatter sites and improves existing services through the urban development programme, to tenements and slum areas. The use of the housing service if the site or the building is provided by the State, is regulated. For example, home-based activity and subletting is discouraged. Combining home improvement or home building with activities that tend to enhance the income flow are not planned in most State sector settlements.

Basic health services: In the form of clinics and hospital services. The pharmaceuticals have to be purchased in the open market in most situations in the State sector hospitals. The prices of essential drugs are regulated by the State, the effectiveness may not be optimal nor beneficial to the urban poor.

Transport: Passenger transport routes are regulated, fares are controlled for the total sector including the State sector.

Education: Access depends on the provision and location. Some urban schools have high demand and the poor are not likely to have equal opportunity to gain access even though they are in the vicinity.

The impact of economic policy on the urban poor tends to operate through the channels of *income and prices*. The urban poor are vulnerable and exposed to price changes in basic goods. They are also less able to produce subsistence goods for themselves due to a lack of access to land. The sites they occupy tend not to have legal title which impedes private initiative in home improvement. Basic services in water and sanitation are over extended and impart serious health risks to the household. The provision of basic services, community health interventions, adult education and efforts to improve the sanitation of the habitat all contribute directly to the reduction of some component of the health-related risks faced by the urban poor household.

We will now examine the effects of different policies on the bundle of *basic goods* of the two urban poor communities.

Food

The urban poor, like most urban households, purchase their food. However, since they have no refrigeration or capacity to keep food without spoiling, preparation is for the requirements of at most a day. Items such as rice, pulses, yams and condiments are purchased for requirements of more than one day. The period depends on the frequency of wage and income flows. A large proportion of the urban poor earn daily incomes. Vegetables are generally purchased for daily requirements and so are the infrequent purchases of fish and meat. Seasonal price fluctuations and more importantly increases resulting from policy impact strongly on these households. On the one hand they do not have the advantages of bulk or quantity purchases, and therefore have to rely on reducing the expected quality to offset price disadvantages. The poor tend to buy the lowest quality vegetables brought into the city. On the other hand they are not able to easily substitute other food.

The imported food products such as wheat flour and sugar figure prominently in the poor urban household's diet. Canned foods such as fish and milk are also important. Meanwhile, processed milk in liquid or powdered form is used by a significantly large proportion of the households.

Changes in subsidies and effects of imported prices of agricultural inputs such as fertilizers and agro chemicals have increased market prices of domestically produced food items such as rice, pulses, yams and vegetables. Recent increases in fuel prices increase production costs and prices of all domestically produced food items including fish.

The problems in the domestic budget as well as problems in the external sector have led to reductions in subsidies and a devaluation of the Rupee and domestic food.

The devaluation of the rupee has increased the rupee value of imported agriculture inputs and imported food.

Policies to increase domestic production through higher floor prices for subsidiary food crops, lentils and pulses led to price increases in the short term.

The privatisation of the State-owned, National Milk Board resulted in an increase in the prices of milk.

The inflationary pressures in the economy since 1981 have tended to reduce the purchasing power of the urban wages. This affects nutrition. Although hard data are not available, intra-family food distribution tends to be biased in favour of adult males. Therefore the children, and females would face increased nutrition risk.

Adjustment and stabilization policies tend to have mixed effects on income and earnings of the urban poor. Slowing down of government investment, construction and foreign trade reduce the growth of casual employment, force the search for new opportunities.

Health Care Services

The new settlement had improved access to health surveillance and intervention through the Community Development Organisation formed when the project was underway. A day care center was set up along with a community center and reading room. The community was able to articulate its demands in an organized and systematic manner. The project assembled and directed a host of state sector services to the community as a result of the project. The Day Care Centre provided nutrition support to the children in the community free of charge. Services of Family Health Workers were directed to the project area.

The squatter settlement, however was unable to "assemble" and articulate its needs as the new settlement. The Day Care Centre set up with Assistance from a nearby Catholic church could not be sustained for long. The community depended on the health services and the clinics in the vicinity and used by other low income households in similar neighbourhoods.

Both communities had similar access to the health care system. The squatter settlement, being located in a mixed, middle and high income neighbourhood, found more private medical care in the vicinity. However, the cost of private medical service is much higher. The new settlement received greater attention of the municipal health authorities as it quickly acquired "show piece" status.

The effects of international price increases on health care are transmitted primarily through the cost of medication and health care in the private sector. The medication given by the public health care delivery system has been reduced as a result of budgetary pressures forcing purchase from pharmacies. The prices of some drugs are subject to controls and the issues related to brand name and generic

prescription remain unresolved. The impacts are the same for both communities.

Education and Other Services

The new settlement benefited from State attention. Training facilities for adults and a day care center for pre-schoolers were set up. The type of school that the community could access however remained similar to what it had been before the project. The access to schools depend in large measure on the location. A squatter settlement may have, as in this case, better access to schools than a new State-initiated settlement. Eligibility depends on location.

The same condition applies to other services. The mitigating factor is the deliberate action of the State to discriminate in favour of one community or setting. Often this occurs when a particular project area is adopted by State agencies. Then it receives preferential access to services. However, the attention is short-lived.

Housing Services

State policies had different impacts on the two communities. The households at the new settlement received a new package of housing and related services. This tended to reduce some of the health risks related to the housing structure and the associated amenities. Water supply and sanitation remained communal services for both communities. However, for the new settlement, the intensity of use was substantially reduced. This paved the way for better maintenance of the facilities. The homes were better in structural quality in the new settlement, reducing the risks associated with damp. The space afforded by the homes remained quite similar.

In a situation where the households gain access to urban land through State intervention, even if they are supported by lending schemes initiated by the State to improve housing, fluctuations and reduction in income induce economic stress. In the new settlement the households assumed a loan obligation to complete a small home. Most spent more than the loan obtained by additional borrowing or through windfall incomes. Some households constructed their homes with a large input of their own labour. For a small proportion of the households with unsteady and low income, the incentive to sell the home, even at a discount because of the lack of title, was overwhelming. The policy to improve the housing services through interventions,

that did not address the issue of unstable income, resulted in some households reverting to the poor quality habitat. Meanwhile, a small proportion of households, that were relatively well off but not able to directly access the site because they did not qualify for the programme, were able to gain access through those who were in need of cash and willing to risk the unauthorized exchange. The sites that the urban poor inhabited, in spite of negative characteristics such as the proximity to a polluted canal, had high economic value. There was no legitimate market for most of this land and therefore it was not easily exchanged. Nevertheless the sites were proximate to a range of urban services and those with sufficiently large incomes could construct homes with the basic amenities. The access to this urban land was restricted and its conversion very slow and dependent on state intervention.

The macro policy affected both communities in a similar way. The impact of the policies were through earnings and prices. The manner in which the households earned income were broadly similar. However, there were differences in the specific occupations arising from the location and the access to labour markets.

Other state policies and the effects of international economic movements tended to impact on both communities in the same way. The reduction of subsidies and the "pass on" effects of international price increases as in the case of fuel prices recently, had the same impact on both communities.

The squatter community was not organized as in the new settlement. The type of community organization that was sponsored as a result of State intervention in the sites and services project was not present here. There was the ubiquitous death donation society which assisted with funeral arrangements. In most squatter settlements there were other organizations and voluntary societies. They included the sports and welfare societies, and others related to events or occasions. Some were affiliated with the temple or place of worship in the neighbourhood. Societies that were organized to interface with the State or the municipal authorities were usually absent in squatter settlements. When specific needs arose, for example to address the threat of eviction, institutions and organizations formed. The public authorities were accessed, when need arose and with some type of institution which was activated or created for that purpose.

The urban household in the squatter settlement was not able to

overcome the deficits of the habitat in the same manner as the new site and services project area. The access to basic services and the possibilities for improvement were limited by State policy towards squatter settlements. Meanwhile, the formation of community organizations to access other complementary services were not as easy as when a large visible project was initiated. Services and resources seemed to be aggregated and flowed into such settings more easily.

The poor urban household was exposed to a range of environmental hazards. These could be classified into two groups of hazards and risk. One resulted from the poor or improper waste disposal within the community. The community was exposed to the risks, associated with regular smoke inhalation from cooking fires that filled homes with smoke and infections from poor waste disposal. The type of housing, density of settlement and the waste disposal technology available to the poor had much to do with this class of risk. The other type of risk was associated with the location. The community might be exposed to industrial waste discharged into the canal bordering the settlement, exhaust fumes and risk of accident from the flow of motor traffic in the neighbourhood.

CONCLUSIONS

The policies enacted and decisions taken in one sector or region of a country affect the livelihoods and well-being of people in other sectors or regions. National level macro-economic policy changes tend to change prices and incomes through most of the economy. However the effects are not spread uniformly. Policies in agriculture will not benefit all groups in a similar manner. Mechanisms to increase agriculture incomes may increase the cost of urban wage goods and adversely affect those with unstable and low incomes in the urban sector. In nominal terms the average income of the urban sector will be higher than other sectors. However the urban household will incur higher costs to generate this income. Food costs will be higher and in most cases the urban household will not have home-produced agricultural goods.

Most poor urban households can only access marginal sites to build homes. The habitat is often over-crowded, poorly serviced with water supply and sanitation and waste disposal. The water supply and sanitation system is often communally used and over-extended.

The mechanisms to generate building sites seem to work slowly. The

State regulates the access to sites. A large component of the urban poor households are squatters and therefore lack title to the site. This discourages private investment in home improvement. The access to better quality services is also affected by the lack of legal title and tenure. Although evictions from squatter settlements are rare, the State retains the right to use these lands for alternative purposes. In some cases the lands that the squatters occupy have potentially high economic value. However the occupants are not able to sell nor capture these potential benefits. Furthermore, the provision of basic services is considered a temporary measure to reduce the burden and the stress of a poor quality neighbourhood. Relocation to less crowded areas on the outskirts of the city is not favoured because of possible adverse effects on household incomes. A significant proportion of poor households generate income in the neighbourhood or through networks in the neighbourhood.

The impact of policies on the urban poor and their health is primarily through household income and the availability and price of basic goods. Increases in the price of food items causes immediate stress to the poor urban household. Intra-family food distribution may be disrupted and vulnerable groups may bear a greater burden. Policies that change food availability transmit stresses to specific groups such as infants weaned on milk foods. Changes in availability and price of items such as wheat flour, sugar and milk powder, resulting from decisions affecting imports tend to transmit adverse effects to the poor urban household. Policies that address the food component of the agriculture sector, and attempt to transform domestic agriculture will have strong price and nutrition effects while the urban poor adjust and make changes. Stimulating production of the staple rice and managing the price of imported wheat to direct demand towards rice, the lowering of export duties for coconut to stimulate exports resulting in increased domestic market prices, are two important examples.

The intervention programmes that seek to transfer purchasing power to the poor, depend on assessment of household income. However, there are no simple methods to incorporate the degree and intensity of income fluctuations for households outside the formal wage sector, into this measurement. Furthermore, the decline in real income as a result of general price increases are expected to be more pronounced for the urban poor household depending on casual, unskilled or small enterprise earnings. Specific vulnerable groups such as pregnant and

lactating mothers and young children are reached by special programmes to monitor nutrition and health. The detrimental effects of declining household income and purchasing power are mitigated by direct feeding and assistance through surveillance. However many other households may not qualify for such timely assistance and therefore some members may face additional risks due to declining economic fortunes.

The stresses, risks and vulnerabilities change in character over time. Some types of policies impart additional risks on the household for a short duration until incomes and prices adjust. However, these adjustments do not take place uniformly for all households. Children, the aged, and the pregnant and lactating women require supports as soon as burdens and risks to nutrition and health appear.

The habitat exposes the poor urban household to a set of environmental hazards and vulnerabilities. The location generates risks linked to water supply, toilet facilities and waste disposal. The neighbourhood adds to the risks with crowding of homes, stagnant, polluted bodies of water and garbage. The home structure generates risks by exposing the household to damp, smoke in cases where cooking is indoors and fire hazards from fuel used for lighting. These vulnerabilities and risks interact with economic vulnerabilities generated by policies and transmitted through incomes and purchasing power. (See Exhibits 1 and 2).

EXHIBIT 1

Expected Health Related Consequences of National Policy

Type of Policy	Household Effect	Expected Health Impact
1. Demand management Changes in government expenditure and taxation	<p>New employment generation reduced in the public sector. Households depending on casual employment may be affected adversely. Temporary employment may be reduced.</p> <p>Subsidy reductions may generate price increases in basic goods especially food imported food items may contain higher transmitted prices, especially wheat flour. Reductions in subsidy to fuel will generate price increases in transport and food.</p>	<p>Reductions in the purchasing power of the household through income and price effects. For households at critical nutrition levels price increases pose additional risks. Intervention programs to ensure stability of nutrition at the household level is through maternal and child health clinics and supplementary feeding programs.</p> <p>Nutrition impairments may be spread unevenly through the household. The very young, aged and the sick may not obtain necessary minimum nutrition to recover or to avoid health risks present in the environment.</p> <p>Reduction in real income may reduce access to services such as health care at the same time.</p>
2. Stabilization Policies	<p>Earnings for those in trade of imported consumer goods, hawkers etc. Price increases of imported goods,</p>	<p>Price increases of items with high import content, food and fuel. Primary effect on nutrition. Availability</p>

of health inputs including drugs and medicaments will tend to rise in price. Exposure to health risk through nutrition reductions as well as higher costs of health care.

Higher cost of food if policy aimed at increasing rural incomes. If regional development policy has rural bias and focus similar effects.

Urban poor unable to readily substitute nor able to cushion food price increases with subsistence agricultural production. Health effects through nutrition.

Reduction of risks resulting from poor quality overcrowded habitat with overused services in water supply and toilet services.

Risk of contamination and spread of disease from water and toilets reduced. Better quality structures reduce the risk of ailments resulting in continued exposure to damp during the rainy season.

Risk of spread of infection due to congestion and crowding reduced.

especially food and fuel it imports are reduced. New employment opportunities in import competing production not likely to be directed to urban poor households.

In agriculture price effects likely till supply adjustments take place. Employment in trade and services increases if expansion takes place, contracts other wise. If imported production inputs are affected, public sector activity reduced, employment and earnings of the urban poor in the respective activities may fall.

Access to better quality water supply, safe drinking water. Better or less crowded toilet facilities. Homes with damp-proof floors and better quality structures. Improvement in habitat with better surface drainage and waste disposal.

3. Sectoral Policies

4. Urban Development and Housing Policy

EXHIBIT 2

Vulnerabilities Hazards and Risks Faced by the Urban Poor Policy

Generated and Environmental

Type of Vulnerability	Origin	Impact
1. Nutrition availability and access lower than critical minimum. At specific time or stages, food availability is reduced.	Agriculture policy. Trade, especially imports of food, instability of household income.	Through food prices on households and especially, children, women aged and sick.
2. Exposure to infection and ill health.	Lowered capacity to purchase food and nutrition, income and price effects of demand management stabilization & trade policies.	On all urban poor, especially those who depend on daily earnings. Depending on size of price increase nutrition of infants, pregnant and lactating women, aged and sick will be adversely affected.
3. Exposure to infection and ill health.	Neighbourhood, Water supply, Toilet, Waste disposal, Structure of the home. Susceptibility to damp.	Ease of spread of disease within household and community, water-borne, through household pests, flies, mosquitoes. Young aged and sick pregnant women at risk. Types of infections and health risks depend on the origin. Water-borne, contaminated food as a result of over used and poor quality toilets from the environment etc.
4. Exposure to infection and ill health.		

	Nature of work and work effort, long hours, in the open or in the vicinity of traffic as in the case of hawkers.	Working adults, especially those in small trade, pavement hawkers, itinerant vendors in the city. Children in commerce especially those assisting vendors in the streets.
5. Exposure to ill health.	Home based activity, producing fumes, dust and waste, especially chemicals.	Especially infants and young and those who spend most of their time in the vicinity of the home.
6. Exposure to injury.	Types of work, small workshop, street vendors.	Adults and young.
7. Exposure to injury.	Home based activity Dust and chemical hazard in a few cases.	Children who may wander into work area use equipment and adults engaged in work or at home.
8. Exposure to injury.	Fire from kitchen in homes where cooking is indoors in the living space, no separate kitchen. Fire because of inflammable nature of structure, and risk of spreading due to close proximity of other homes.	Adults and children. Accidental use of kerosene.

URBAN POLICIES AND HEALTH IMPLICATIONS IN INDIA

INTRODUCTION

Urbanization as a world-wide phenomenon is generally associated with industrialisation, though the degree of association, especially the causal one, may vary greatly from country to country. In developing countries, however, urbanization is taking place at a rate which is much faster than the rate of their industrialization. Many cities in developing countries have grown rather large not due to industrial activity, but because of their administrative, marketing or other character. Similarly, the process of migration, which accounts for 40 to 70 per cent of the urban growth, is not always associated with economic opportunities available in urban centres; often it is due to the “push factors” resulting from poverty, unemployment and social discrimination at the rural end.

The urbanization in developing countries is, therefore, sometimes referred to as “subsistence urbanization” or “over-urbanization”¹. A large proportion of people in urban areas in developing countries indeed live on a level of urbanization with low level of housing, clothing, diet and other amenities of life they can afford to buy. The urbanization is giving rise to cities where a majority of individuals live under conditions that are worse than those in the rural areas from which they have migrated and do not have such means of support which will permit them to do more than merely survive. The homes and neighbourhoods where these growing number of poor

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people live severely lack the basic services and amenities necessary for healthy living viz., safe drinking water, facilities for disposal of household and human waste, proper drainage system, health care and other services etc.

Studies based on evaluation of living conditions in low income areas in developing countries suggest the incidence of the following three major types of pathology in urban areas²:

- i) Infectious and gastro-intestinal diseases,
- ii) Chronic degenerative diseases, and
- iii) Pathogenic conditions associated with stress often precipitated by social isolation, insecurity and social conflicts.

The above diseases, closely associated with poverty, overcrowding and poor sanitation and environmental conditions are among the major causes of morbidity and mortality in urban areas in developing countries.

Notwithstanding the problems and undesirable effects of large concentrations of people in areas with inadequate supporting facilities, urbanization is necessary as well as desirable for the economic growth and modernisation of a country.

URBANISATION IN INDIA

Urbanization in India, in the post-Independence period, has taken place together with economic growth and industrialization. During the period, the country has achieved substantial and steady growth in the national economy. As a natural consequence of the economic changes, there has been nearly a three-fold increase in the country's urban population — from 62 million in 1951 to 160 million in 1981. In relative terms, the level of urbanization during the period increased steadily from 17.6 per cent to 23.3 per cent. The present level of urbanization in the country is estimated to be about 27 per cent with a total urban population of about 220 million.

This massive size of the country's urban population, can be gauged from the fact that it is greater than the population of any country except three countries in the world. This population is distributed over 3301 urban settlements. Of these urban settlements 218 had a population of (1981) 100,000 and above and 12 of them had a population of 1 million or more. Thus, more than 60 per cent of the urban

population is concentrated in about 6 per cent of urban settlements. While the annual rate of urban growth during the period 1971–81 in the country was 3.86 per cent, in a number of large and medium size cities it was even more than 5 per cent. It is expected that the number of cities with one million population and above is likely to increase to about 20 with a total population of about 65 million by 1991. The share of these metropolitan cities alone in total urban population will be about 28 per cent³. A comparison of the two components of urban growth, viz., natural increase and growth due to migration, shows that 41 per cent of the urban growth during 1971–81 has been due to natural increase and 40 per cent due to migration. The remaining 19 per cent urban growth was due to reclassification of rural areas as urban. The migration streams have been both direct migration (from rural area to large cities) as well as step migration (from rural area to small town to large cities). There is very little evidence of a reverse migration of any substantial magnitude from large cities towards small towns or rural areas⁴. The rapid growth in urban population in the country has taken place in the context of a complex mix of economic, social, political, demographic and ecological factors. In spite of the massive size of urban population accompanied by rapid growth, we have not yet evolved a comprehensive policy and proper programmes of action for the planning and development of urban areas.

Although the need for city planning was recognised at the very beginning of the planning period, the resources devoted to the provision of various infrastructural facilities, amenities and services in the urban settlements have been extremely inadequate for meeting the requirements of the rapidly growing urban population. Hitherto, the main focus of our planned efforts has been on other “priority areas”, such as agricultural development and industrialisation. Urban development has been considered as one of the residual areas of planning.

As a consequence, the urban settlements have grown in a haphazard manner severely lacking in the social and physical infrastructure to serve the needs of the urban inhabitants. The basic services and amenities essential for healthy living are in critically short supply.

URBAN POLICY GUIDELINES

The Five Year Plans, the primary instruments through which planning efforts are made, spell out some policy guidelines and outline

the development activities and pattern of plan investments of the government with regard to urban development. The review of the seven Five Year Plans formulated so far with reference to urban policy showed that the plan approach and policy towards urban development have emphasised on:

- i) Establishment of institutional infrastructure for urban planning:
 - (a) legislation of Town and Country Planning Act at the Central level and State level;
 - (b) setting up of town planning organisation in each State; and
 - (c) expansion of training facilities for town planners and architects;
- ii) Preparation of master plans, regional plans and their implementation:
 - (a) survey and preparation of master plans for cities and towns and regional plans for resource regions;
 - (b) planning for the development of urban areas in their regional context;
 - (c) integrated implementation of all the development plans with urban development implications;
 - (d) legal provisions for the implementation of regional plans by local authorities; and
 - (e) integration of physical plans with investment plans;
- iii) Balanced urban development:
 - (a) policies for slowing down the growth of metropolitan cities;
 - (b) promoting the development of small and medium towns; and
 - (c) enlarging the scope and functions of industrial townships;
- iv) Specific schemes for improving urban environment:
 - (a) clearance and improvement of slums;

- (b) augmentation of civic services;
- (c) augmentation of housing stocks; and
- (d) provision for water supply and sanitation;
- v) Improving urban administration:
 - (a) review and rationalisation of municipal administration;
 - (b) establishment of urban development authorities;
 - (c) reform of municipal tax system; and
 - (d) control on the values of urban land;
- vi) Establishment of supporting institutions:
 - (a) Housing and Urban Development Corporation;
 - (b) National Banking Organisation;
 - (c) the proposed National Housing Bank; and
 - (d) the proposed National Urban Infrastructure Development Corporation; and
- vii) Establishment of and support to research institutions for carrying out research in the field of urban development.

The above policy statements/guidelines have been evolved at different stages during the seven plan spanning over 1951–1990. The different Five Year Plans have emphasised on different policy aspects outlined above. As a whole, the policy statements on planned urban development have been appropriate keeping in view the prevailing socio-economic situation in the country. However, the efforts made to translate the policies into programmes of action in the different plans have not been adequate and effective.

URBAN DEVELOPMENT PROGRAMMES

A review of the urban development programmes initiated during the different Five Year Plans brings out the following:

- i) The regional approach to planning for urban development has been emphasised since the Second Five Year Plan. However, there has been little evidence of the approach being followed in the planning.
- ii) For about two decades since the launching of the First Five

Year Plan in 1951, the efforts for planned development of urban areas remained confined to the enactment of TCPA, setting up of town planning organisations, and the survey and preparation of development plans. The usefulness of town planning organisations has been questioned because of their orientation solely towards physical planning.

- iii) It was in the Third Five Year Plan that the patterns of economic development and general approach to industrial locations were considered to be the most decisive factors in the process of urbanization. Accordingly, it was suggested that as far as possible, the new industries should be established away from the large and congested cities in order to slow down the growth of large cities. The subsequent plans also emphasized on slowing down the growth of metropolises. Despite all these policy statements, the large cities witnessed unabated growth since Independence. The number of million-plus cities increased from 5 in 1951 to 7 in 1961, 9 in 1971 and 12 in 1981. There is a possibility of this number getting almost doubled in 1991. In 1981, the 12 largest cities among the 3300 urban settlements accounted for 27 per cent of the total urban population.
- iv) Although the need for exploring the potentials of developing small and medium towns was recognised in the Fourth Plan itself, it was only in the Sixth Plan that a scheme of Integrated Development of Small and Medium Towns (IDSMT) was introduced, under which about 200 towns with a population of less than one lakh were expected to be developed with a provision of Rs. 96 crore in the Central Sector and matching contributions from the concerned state governments. The lack of proper planning is reflected in the fact that in spite of the acute shortages of infrastructural facilities in the towns, the meagre provision of about Rs. 200 crore could not be utilised in the five year period of the plan.
- v) The water supply and sanitation facilities in small and medium towns were to be provided on a priority basis during the Sixth Plan. However, these towns continued to suffer during the Sixth Plan period as ever before. The neglect of these towns in this regard was attributed to resource constraints and the emphasis on providing safe drinking water

facilities in rural areas.

- vi) The emphasis in the various programmes of urban development, evolved and implemented during the seven plan periods, has been on meeting the shortages of a variety of infrastructural and other facilities in the urban areas rather than on stimulating their development. These programmes can broadly be grouped into three categories — area specific, scheme specific and general purpose. The examples of area specific schemes are the development of Calcutta Metropolitan Area, National Capital Region, and State Capital Cities, viz., Bhopal, Bhubaneswar, Gandhi Nagar and Chandigarh. The scheme specific programmes are mainly with regard to housing facilities, clearance and improvement of slums, and the development of small and medium sized towns. The general schemes include the provision of plan resources for the development of urban infrastructural facilities in general and for providing water supply and sanitation facilities.
- vii) The share of the outlay for the development of urban areas in the total plan outlays in the seven plans has been very meagre — ranging from 2.7 per cent in the first plan to 4.3 per cent in the fifth plan (Exhibit 1). The share in the Sixth and Seventh Plans was respectively 4.0 per cent and 3.7 per cent. In the first two five year plans, the total outlay was claimed by urban housing and water supply and sanitation. These two components accounted for 96 per cent and 85 per cent of the outlay in the Third and Fourth Plans respectively. In the Fifth Plan, the combined outlay for the two components was substantially reduced to 68 per cent. In the Sixth and Seventh Plans it was 74 per cent and 73 per cent respectively. In addition to this, a good proportion of the outlays for the integrated development of Calcutta Metropolitan Area, State Capital Projects, Integrated Urban Development Project, Integrated Development of Small and Medium Towns Scheme, and the National Capital Region Scheme also have been spent on urban housing and water supply and sanitation. Thus, the bulk of plan resources for urban development has been claimed by these two components. But, in spite of this lop-sided allocation of plan resources, the shortage of housing and water supply

and sanitation facilities continue to be acute.

From the preceding discussion, it is obvious that deliberate efforts have not been made to link the process of urbanization with the general pattern of economic development and the location of economic activities. Similarly, there is little evidence to suggest that the regional approach to planning for urban development has been accorded due importance. The twin objectives, viz., slowing down the growth of large metropolitan cities and the development of small and medium towns, have, largely, remained unfulfilled. By and large, the efforts in the planned development of urban areas have concentrated on the augmentation of infrastructural facilities and other services in the relatively large cities.

The policy of development of counter-magnets, ring towns and satellite towns has not been very effective since investments in areas where infrastructure facilities are lacking and urban economies of scale are absent, do not generate significant multiplier effects. The policy has given rise to a mixed system of urban centres with sharp differentials in their growth patterns. Regional dispersal of urbanization requires an integrated strategy of developing the entire spectrum of urban system in a hierarchical manner. In this effort, priority should be given to the development of regional metropolises in the first stage.

Urban development policies are concerned with a wide spectrum of macro-level as well as micro-level issues. The major issues relate to urban size and growth, housing, urban land development, traffic and transportation, urban environment, urban administration and resources for urban development. These policy areas are to a high degree mutually interdependent and have strong roots in geographic space⁶.

THE EMERGING URBAN ENVIRONMENT AND ITS IMPACT ON HEALTH

The rapid growth of urban population in India, supported by the limited capacity of urban authorities to provide infrastructure facilities, has resulted in an urban environment which is unsuitable for a healthy and dignified living. Inadequate housing and transport facilities and other services, overcrowding, poor living conditions, lack of proper sanitation and sewage facilities, drinking water, filth, disease and sickness are so common in the cities that many a times urbanization is termed as undesirable phenomenon.

URBAN POOR

The National Commission on Urbanization has observed that:

“the most demanding of the urban challenges, unquestionably, is the challenge posed by poverty: the challenge of reducing exploitation, relieving misery and creating more humane conditions for working, living and growth for those disadvantaged people who have already made the city their home or are in the process of doing so”.

The urban poor, who constitute a large proportion of population in the cities, are unskilled or semi-skilled, uneducated, underemployed and undernourished city dwellers living on pavements, in slums or in dilapidated houses, and struggling to make a living from low paying and unsuitable occupations⁷. The living conditions of this group of population are conducive to many infectious, chronic and degenerative diseases.

A large proportion of the urban poor are those migrants who have left their families behind at their previous place of residence and come to the cities in search of jobs. While in some cases their families join them once they secure a job, in many other cases the income level is so low that they are forced to live alone in cities and support their families by remitting a part of their income. This type of migration pattern that has become an integral part of the survival strategy of the poor households is responsible for several psycho-social problems prevalent among this group of urban inhabitants.

According to the official estimates, approximately 27.7 per cent of the urban population fall below the poverty line. In fact, the actual population of urban poor is much higher in view of the fact that the proportion of people living in slums alone would be about 25 per cent and not all the poor population live in slums only. According to the estimates of the National Building Organisation in 1981, among the cities with one million and above population, Kanpur City had the largest proportion of slums population (40.3%), followed by Lucknow (38.8%), Bombay (38.3%), Calcutta (35.4%), Madras (31.9%) and Delhi (30.2%). In the case of other cities and towns the proportion varied from 10 to 30 per cent. As per the estimates of slum population made by the Task Force on Urban Development set up by the Planning Commission, the proportion varied from 15 to 45 per cent⁸.

Characteristically, the slums are located in low lying unhygienic sites

like quarry pits, tank beds, railway sidings, and near cemeteries, slaughter houses, timber yards etc., although slums are found elsewhere too. Generally, physical conditions of slums present a picture of neglect, with awfully inadequate water supply, bath and toilet facilities and stagnant cess pools in front of most of the hutments. A study of socio-economic conditions in 11 selected slums in Bangalore showed that 98 per cent of the sample households were without toilets, 92 per cent without bath rooms, and 61 per cent without kitchens. The surroundings of the slums are filthy, stinking and highly polluted especially due to solid-waste pollution⁹.

Until recently, the Government's response to the issue of urban poverty has been inadequate, half-hearted and unimaginative and the urban poor were equated with slum dwellers. Poverty removal as a major policy objective in the country's development strategy was, for the first time, emphasised in the Fifth Five Year Plan. However, it was only in the Seventh Plan that the issue of urban poverty was addressed to directly. The Seventh Plan proposed a clearly defined strategy that included provisions for generating employment, raising the earnings of the urban poor, and improving their access to basic amenities. However, the success of the strategy will depend on the results of the action programmes such as, Self-Employment Programme for the Urban Poor, which are being developed and implemented.

URBAN HOUSING

The issue of urban housing is directly related to that of urbanization. While urbanization in the country is increasing at a rapid rate the corresponding increase in housing supply in urban areas has been very slow. Consequently, the country is facing acute shortage of housing, particularly in large cities, for the last several decades. According to the estimates of the National Building Organisation, the present backlog of housing needs in urban areas in the country is about 7 million.

The ever-widening gap between the demand and supply of housing in urban areas has severely affected the living conditions of urban inhabitants. Extreme overcrowding, dilapidated house structures, absence of minimum basic amenities in the dwellings and lack of basic services in residential localities are common features of living

conditions in all large cities in the country.

From the beginning of the planning era, Government of India, in its urban development efforts, has continued to emphasise the importance of housing sector. However, due to the constraints of the resources the programmes for augmentation of shelter have been at a modest scale. Moreover, enough attention has not been paid to improve access of people to the other housing inputs such as land, finance, building materials, technology and services. Further, there are several legal, institutional and administrative constraints which not only discourage the people from taking housing initiatives but also force them to neglect maintenance of the housing stock.

Considering the importance of shelter as a basic human need, Government has recently formulated a National Housing Policy (NHP) expounding the objectives, priorities and strategies for promoting sustained development of housing in the country¹⁰. The policy document provides guidelines with regard to:

- (i) Objectives of the policy,
- (ii) Priorities to promoting shelter for the houseless and disadvantaged groups,
- (iii) Strategies to achieve the objectives,
- (iv) Minimum housing norms,
- (v) Rural Housing strategy,
- (vi) Informal sector housing and slums,
- (vii) Legal environment — laws and regulations affecting housing,
- (viii) Land policy,
- (ix) Housing finance,
- (x) Fiscal incentives,
- (xi) Building materials,
- (xii) Housing and development agencies,
- (xiii) Human resources,
- (xiv) Research and Development,
- (xv) Repairs and renewal,
- (xvi) Housing for the specially disadvantaged,

- (xvii) Rental Housing,
- (xviii) Role of non-governmental organisations,
- (xix) Regional Administrative and regional linkages,
- (xv) Environment,
- (xxi) Heritage and conservation,
- (xxii) Management information system and
- (xxiii) Action plan, implementation, monitoring and evaluation.

The policy guidelines are quite comprehensive. However, the impact of the policy on the housing situation will be seen only after suitable action programmes are designed and implemented. A few steps such as creation of the National Housing Bank and provisions of fiscal incentives for housing investment have already been initiated (See Case III.1 for more discussion on NHP).

WATER SUPPLY AND SANITATION

An adequate supply of safe and potable water and sanitary disposal of excreta and other solid wastes are most essential to protect people against communicable diseases caused by biological contamination of water. In India, like in most developing countries, communicable diseases are responsible for a very large number of illnesses and deaths. A large proportion of people in the country are without access to safe and adequate water supplies. Similarly, most urban settlements do not have proper sanitation facilities for the disposal of human faeces and other solid wastes.

While in large cities, the proportion of population having access to municipal tap water is about 86 per cent, in small towns it is only 39 per cent. Further, it is estimated that almost one-third of the urban population do not have adequate toilet facilities which are minimum requirements for proper disposal of human wastes¹¹. Facilities for collection and disposal of solid wastes are also very inadequate in most of the urban settlements.

The necessity of safe and adequate water supply as well as the collection and disposal of community wastes in urban areas was recognised in the First Five Year Plan itself. At the time of launching the First Plan, only 6 per cent of the urban settlements in the country, covering about 48 per cent of the total urban population had protected water supply. Further, only 23 cities and 12 towns had sewerage

system. However, only a limited allocation of Rs. 120 million was made for urban water supply and drainage schemes.

In the Seventh Plan, it was estimated that about 81 per cent of urban population would have been provided with protected water facilities and 33 per cent with sanitation facilities by the end of the Sixth Plan. In this plan, a provision of Rs. 29,356 million was made for urban water supply and sanitation schemes.

While there has been considerable progress in providing protected water supply in urban areas in the country the same cannot be said about the sanitation facilities. The small and medium sized towns have been continuously neglected in this regard due to resource constraints and the emphasis on providing facilities in large cities in the earlier plans and in rural areas in the later plans.

URBAN TRANSPORT

Urban transport is not only an essential service required to provide accessibility links between residence and employment, and between producers and users of goods and services, but also a crucial factor which determines the structure and efficiency of the city system. Apart from facilitating the movement of people and goods, urban transport compliments a number of other public services, like collection and disposal of solid wastes, maintenance of sewerage, water and electricity networks, availability of shopping and service facilities.

With the rapid increase in urban population in the country, the number of passenger trips performed by the inhabitants of urban centres has been increasing continuously. Further increase in economic activities in the cities is generating large volume of freight traffic. This increased movement of people and goods is resulting in greater demands on the transport systems in urban areas.

However, the transport facilities in all urban areas in the country are far from satisfactory. Public transport system in most cities is inadequate and inefficient. Mixed mode traffic, road-space ratio, uncontrolled parking, mixed land use patterns and poor traffic management are causing extreme traffic congestion in large cities. The high density of vehicles on the road causes traffic accidents and environmental pollution. In 1981, 156 thousand people died in road accidents in the country. The highest number of fatal accidents per lakh of population (1981) took place in Delhi, followed by Bangalore, Hyderabad, Madras and Calcutta. The unsafe transport system also

generates fear of accident and causes mental stress in commuters themselves and their near and dear ones.

The approaches to tackle transport problems in the country have been rather half-hearted. The important ones among these are the dispersal of population and economic activities from the city-core to peripheries, and development of satellite towns around major cities. It is implicit in these policies that the provisions of minimum facilities in satellite towns accompanied with a package of incentives and disincentives would result in the diversion of population and economic activities from large cities. However, the experience of New Bombay and the towns and cities of the National Capital Region in diverting the population and economic activities from Bombay and Delhi do not give any positive indication to this effect. The policies designed to solve urban transport problems have also lacked in finding effective ways to reduce the separation of residences from work-places, and shopping and services.

CONCLUSION

The urban population in India is not only massive in size, but it has also been growing at a rapid rate. The number and population of large cities are also increasing rapidly. With active urbanization and consequent concentration of people in large cities, the policy makers and planners are facing an arduous task of finding ways of providing the basic infrastructure facilities essential for a healthy living in the cities.

The macro level urban policies evolved for achieving a balanced and efficient urban growth have emphasised on slowing down the growth of metropolitan cities, development of 'counter-magnets' and satellite towns, providing infrastructure facilities in rural areas, and so on. Further, the micro level policies have advocated preparation of master plans, development schemes for improvement of urban environment and augmentation of infrastructure facilities such as housing, water supply and sanitation, and civic services. The policies have also included improvement in local urban administration, regulations, taxation, control on land values, establishment of development authorities and other supporting institutions.

While the broad policy objectives articulated in the planning documents have been quite appropriate, the corresponding development programmes have not been very effective in achieving the objectives.

The programmes have reflected the low priority given to the development of urban areas and also the lack of resources deployed for tackling the mounting urban problems. In addition, many of the programmes aimed at improving the lot of urban poor have never reached the people for whom they were intended.

Poor living conditions, housing shortage, inadequate and often contaminated water supply, poor sanitation and waste disposal facilities have created an urban environment which is unsuitable for healthy living. Malnutrition, respiratory infections, diarrhoeal diseases, stress-related physio-social problems are largely the product of the poor urban environment.

The brief review of the policies and programmes for the development of urban areas presented in this paper shows that the policy objectives need to be clearly defined, the strategies to achieve the objectives need to be spelled out and action programmes backed by adequate resources have to be developed for efficient and equitable growth of urban areas. The recently developed National Housing Policy which is aimed at solving an extremely important problem in urban areas appears to be a right step in this direction. However, the success of this effort will largely depend on what action programmes are developed and how they are implemented.

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EXHIBIT-1

Outlay for Urban Development
in the Five Year Plans

(Rs in Ten millions)

Five Year Plan and Period	General Develop- ment	Housing	Water Supply and Sani- tation	Total Outlay for Urban Devlp.	Total Plan Out- lay	% Outlay for Urban Devlp. to Total Outlay
I (1951-56)	—	48.61 (75.0)	16.17 (25.0)	64.78 (100.0)	2356.0	2.7
II (1956-61)	—	78.49 (57.5)	58.00 (42.5)	136.49 (100.0)	4800.0	2.8
III (1961-66)	17.70 (6.4)	169.42 (61.4)	89.00 (32.2)	276.12 (100.0)	8573.0	3.2
<i>Three Annual Plans</i>						
(1966-69)	17.76 (15.0)	78.85 (66.9)	21.31 (18.1)	117.92 (100.0)	6576.5	1.8
IV (1969-74)	70.80 (13.7)	170.23 (32.9)	276.00 (53.4)	517.00 (100.0)	15902.2	3.3
V (1974-79)	505.46 (31.9)	540.92 (34.1)	539.17 (34.0)	1585.55 (100.0)	37250.0	4.3
VI (1980-85)	997.53 (25.7)	1127.34 (29.1)	1753.56 (45.2)	3878.46 (100.0)	97500.0	4.0
VII (1985-90)	1801.29 (27.1)	1879.31 (28.2)	2971.25 (44.7)	6651.85 (100.0)	180000.0	3.7

URBAN POLICY — HEALTH LINKAGE: Policy Options

A. POLICY OPTIONS ON HOUSING AND SLUM PROBLEM

This situation has attracted the attention of policy makers. It is believed that in fulfilling the basic needs of the people, housing ranks next in importance to food and clothing. The development of housing must be given a high priority in society, since it fulfils many other needs such as raising the standards of sanitation, creating additional employment, dispersing economic activity and improving urban renewal. Past policy responses have included both slum clearance and attempts to upgrade, as well as self-help schemes and granting of legal title to squatters on occupied land.

HOUSING LEGISLATION

Legislative measures or policy declarations alone are not enough. The constraints posed by inadequate resources, urban legislation and other related policies must be taken into consideration in order to ensure effective implementation. Although the urban policy guidelines developed from time to time by governments have continued to emphasize the importance of the housing sector, the programmes initiated and the investments made in many countries have responded to only a small fraction of the enormous problem of urban housing shortages in countries. Attention needs to be paid to improving access to housing inputs such as land, finance, building

The policy options presented here emerged from the deliberations on the cases in this module in "The Implications of Public Policy on Health Status and Quality of Life: A Symposium, Bangalore, 18– 26 October, 1989, World Health Organization, SEARO, New Delhi".

materials and services. Legal, institutional and administrative constraints which discourage people from taking housing initiatives and force them to neglect the proper maintenance of existing housing stock should be minimized.

Because of the social, physical and economic complexity of slum formation it is very difficult to assess how far policies and schemes introduced by governments have been effective in checking the growth of slums, or arresting any further deterioration in the health and quality of life of slum dwellers. In examining the policies of India one sees a pressing need to develop a comprehensive, perhaps segmented policy for tackling the problems in such a large country. For instance the employment profile varies with the industrial/trade scenarios in cities, with slum dwellers of large cities being more dependent on regular jobs than slum dwellers of smaller cities.

THE NEED FOR PLANNING

It was pointed out that overcrowding in large cities and metropolises has been the result of lack of planning to encourage the development of smaller towns and growth centers at appropriate distances from one another. When a number of smaller towns exists around the main city, movement of people is better organized and contained, relieving the main city of overcrowding and congestion.

Location of industries in big cities aggravates the problem. Development of smaller towns and industrial growth centers at appropriate distances from cities should be encouraged. This could be done through siting of industrial parks and creation of special incentives such as tax exemptions, subsidies, credits, and relaxation of input restrictions to attract private sector investment in physical infrastructure development.

BEYOND PLANNING — SLUMS AS A SOCIOECONOMIC PROBLEM

Although slum improvement has been attracting the notice of many governments, the policies have room for improvement. There are few examples, if any, of a systematic approach to tackling the underlying problems of urban deprivation or of providing a comprehensive plan for the health and well-being of all city-dwellers, including those living in slum areas. While there are short- and long-term plans that sometimes reach out to vulnerable groups, they seldom encompass all the relevant needs, resources, and activities and give priority to income generation and education, as well as water supply, housing

sanitation and nutrition. Achievement of the above relies on political will to take the appropriate policy measures and proper intersectoral coordination among all implementing agencies.

Tackling a problem of this complexity will involve many sectors at all levels. The importance of the educational component cannot be over-emphasized. It must be wide in scope and must operate at various levels, creating awareness at some, changing attitudes at others, and imparting skills in management and coordination to key personnel. The poverty of slum occupants, their fatalistic outlook and resignation are constraints to policy and programme implementation. Social preparation and provision of information and education of the urban poor are essential in bringing about a positive result.

B. SUGGESTION FOR FURTHER POLICY ANALYSIS

Work through these policy options outlining the advantages and disadvantages of each. Decide which of these, or any other, you would adopt, and give reasons for your choice. Explain the anticipated difficulties in implementing these, and identify opposing views which might be expressed, and identify wherever possible, individual groups that would hold these opposing views. Outline, how you, as a policy maker, would defend the policy options you have chosen and explain the strategy you would use.

METHODOLOGIES FOR POLICY ANALYSIS ON INTER-SECTORAL ACTION

INTRODUCTION

The rationale for inter-sectoral action in support of health and quality of life stems from the fact that health status of people is determined not merely by actions within the health sector. Health sector itself has recognized, for quite sometime now, that its role is not just to save human lives or suffering through curative care. Prevention of ill health and promotion of good health are among the key roles of the health sector. Technological developments within the health sector have made it possible to improve substantially the effectiveness of the curative care component of the health care systems in many countries, and the potentialities for preventing certain types of sicknesses and promoting health. The developed countries have benefited more from such advancements, while many developing countries have failed to take advantage of these. Admittedly, there is scope of further health improvements by actions within the health sector, and all Ministries of Health are attempting to achieve these within the realms of feasibilities. It is acknowledged that certain actions are needed in some relevant sectors, so as to generate favourable health outcomes. The issue is how to promote such actions within non-health sectors which have minimal adverse health outcomes, and others which have maximal favourable health outcomes. The strategy for achieving intersectoral action in support of health has to include an important element viz. how to make public policy makers in non-health sectors realize the importance of health effect considerations

This background paper was prepared by Basu Ghosh, Indian Institute of Management, Bangalore as a basis for discussion.

in their decisions pertaining to the concerned sector. This necessitates thorough appraisal of public policies in non-health sectors from the special perspectives of the health sector.

RESEARCH NEEDS FOR POLICY ANALYSIS

SITUATION ANALYSIS

Policy-makers need to be apprised of the current situation in regard to health effects of their sectoral policies. This calls for *situation analysis*. Among other things, such an analysis will include:

- Identification of explicit and implicit policies governing the sector,
- Assessment of elements in these policies with likely favourable/unfavourable health effects,
- Evaluation of implementation of policies (such as legislation, enforcement machinery or organisational arrangements, public relations), and
- Incorporation of feed-backs from policy implementation to further policy adjustments, planning processes and system designing.

The situation analysis may include:

- *Context Analysis* (i.e. understanding of the socio-economic, political and technological setting within which a policy is formulated),
- *Process Analysis* (i.e. understanding of the ways policy decisions and plans are arrived at and implemented or evaluated; expected and actual roles of various Ministries and national/international agencies).
- *Risk Analysis* (i.e. explicit assessment of health risks associated with development policies based on available knowledge of likely risks, or current epidemiological investigations).
- *Institution Analysis* (i.e. evaluation of strengths, weaknesses and opportunities available in existing institutional arrangements for policy formulation; management information systems; programme planning; programme implementation, monitoring and evaluation), and

- *Impact Analysis* (i.e. systematic assessment of gains/side effects of specific policies and programmes, especially from health and quality of life considerations).

SOCIAL COST-BENEFIT ANALYSIS

Policy making and planning requires identification of various available options in any decision situation, and an appraisal of these options, and the selection of one or more of these options for implementation. Social Cost Benefit Analysis enables policy makers to appraise the options in terms of:

- economic costs (in money terms),
- economic benefits (in money terms),
- social costs (intangibles expressed in money terms),
- social benefits (tangible or intangible non-economic benefits expressed in money terms),
- weighing of overall costs and benefits through computation of a Cost-Benefit Ratio for each available option, and
- comparison of these options to decide on one or more of these.

The technique of Social Cost-Benefit Analysis has been used in the health sector in a variety of decision contexts, e.g:

- assessing the worthwhileness of investing resources in a family planning programme,
- evolving an economic model of malaria eradication,
- identifying strategies for reduction of motor vehicle accidents,
- examining the desirability of running a public health laboratory for checking food adulteration and providing testing services.

Potential and actual applications of Social Cost-Benefit Analysis in non-health sectors, with expected high favourable or unfavourable health outcomes include:

- assessment of alternative pollution control technologies for treatment of effluents before discharge, monitoring

- of environmental quality and enforcement of legislation,
- examination of the desirability of mounting an occupational health service in an industry from productivity and industrial relations considerations apart from likely health impact,
- selection of irrigation strategies from broad societal considerations along with economic/productivity criteria,
- assessment of strategies for decongesting slum habitats, such as slum clearance, environmental improvement and slum upgradation programmes,
- examination of the desirability of mounting special health care programmes for slum dwellers/child labourers/other highly vulnerable groups,
- selection of housing schemes (for promotion by civic authorities) with explicit considerations of health effects,
- identification of pesticides for import or local production on costs, efficacy and health effect considerations,
- assessment of strategies for elimination/reduction of pesticide residues in food, and for minimizing health risks of pesticide use, etc.

RESOURCE ALLOCATION MODELS

Public policy makers are often confronted with decision situations in which choice is not in terms of 'Yes' or 'No' to a certain programme option, since many such options can be justified on one ground or another. In such situations, the problem can be resolved through a resource allocation model. An example of such a resource allocation model pertains to apportioning a specified health sector budget for preventive health services to a number of disease control programmes. This approach has also been applied for allocating resources to various components of a Tuberculosis control programme. Resource allocation models use optimization techniques such as Linear Programming or Input-output Analysis for allocation of scarce health sector funds under various constraints. An example of application of input-output model in a non-health sector, with favourable health outcomes, is in the area of pollution control. A model has been developed to examine the feasibility and economic implications of redesigning a nation's industrial structure on considerations of inputs, outputs, pollution effects, technologies for pollution control etc.,

so that pollution is significantly prevented or reduced. Potential applications of resource allocation models in the context of inter-sectoral action for health include the following:

- resource allocation to curative health care services and preventive occupational health measures in an industry,
- resource allocation to various minor irrigation projects and major irrigation projects in a given agricultural context,
- resource allocation to various child labour using industries to have maximum favourable health outcomes or minimum adverse health outcomes,
- decision on optimum product mix in agriculture so as to maximize food production given the agricultural resource constraints and other system constraints,
- resource allocation to various schemes for mitigating adverse health effects of living in slums.

EXPERIMENTAL AND QUASI-EXPERIMENTAL STUDIES

The greatest hurdle in catalyzing inter-sectoral action in support of health is the lack of hard data demonstrating health effects of policies in non-health sectors. The best solution to this problem lies in conducting scientifically designed experiments and analysing data so collected to isolate net health effects of specific policies and programmes. Consider an example from the agriculture/irrigation field. A major irrigation project involving a massive dam construction is approved in a certain area, and several minor irrigation projects (not involving construction of dams) are initiated in other areas. Here an experimental study will involve:

- a) conducting a pre-study of the command area of the dam in terms of epidemiologic situation and quality of life,
- b) a study as above in an area (control group) similar in many characteristics but not in the command area of any major dam,
- c) studies similar to (a) and (b) in respect of minor irrigation projects in comparable areas,
- d) post-study in all the areas treated as experimental (treat-

ment) areas and control areas,

- e) analysing the data collected to evaluate net health (and other) effects of the policies of major/minor irrigation projects.

Similar experimental projects can be designed for problems such as under:

- Estimation of net health effects of mounting a special slum health facility or a child labour health facility,
- Estimation of impact of a special health education drive targeting farmers for mitigating adverse health effects of pesticide use in agriculture,
- Estimation of environmental impact of introducing an expensive pollution control technology in a certain industry.

Laboratory investigations using animals is, of course, a frequently used experimental method in health research. Such methods have been used, for example, to study pesticide effect on animals of varying nutritional status; also to study genitotoxicity of pesticide residues in food, and toxicity of frequently used chemicals.

Unfortunately, however, public policy makers are often not willing to wait for long periods of time to observe the outcomes of experimental studies, before they make policy decisions. A possible way out is to conduct small pilot projects. But pilot projects are often criticized as unrepresentative of real life situations; replicability is often contested. Also, short duration pilot projects cannot yield sufficient evidence of certain health effects. A more realistic approach is to conduct quasi-experimental studies or analyze natural experiments.

Examples of Such Studies Include:

- Estimation of differential health status and quality of life in families (a) which include child labour, and (b) which do not contribute child labour,
- Determination of health status of families living in one-room, two-room non-slum accommodations and others living in slums,
- Estimation of occupational health situation (morbidity levels) in institutions with varying levels of health care

facility,

- Assessment of health status of farmers engaged in production of different crops involving varying levels of pesticide use.

MULTIVARIATE STATISTICAL ANALYSIS/AREAL ANALYSIS

Association analysis using multivariate techniques with areas/institutions/groups of individuals as units of analysis provides yet another strong methodological option. The techniques involved are multiple regression, factor analysis, multiple classification analysis etc. Consider an example. A country has (say) 25 urban settlements. Information is available on a number of variables from each settlement:

Dependent	Y(1)	Crude Death Rate
Variables:	Y(2)	Infant Mortality Rate
	Y(3)	Morbidity Rate (communicable diseases)
	Y(4)	Morbidity Rate (Non-communicable diseases)
	Y(5)	Accident Death Rate

Independent	X(1)	Population size of city
Variables:	X(2)	Population (%) living in slums
	X(3)	Population Density
	X(4)	Expenditure on health care by city authorities.
	X(5)	Income level of city's people (average)
	X(6)	Educational status of city's people
	X(7)	Percent of households having satisfactory environmental sanitation facility.
	X(8)	Percent of households having access to toilet facility.
	X(9)	Percent of households living in one-room (non-slum) houses.
	X(10)	Expenditure on road maintenance and traffic control etc.

A multivariate study enables estimation of net effect of each independent variable on any one of the dependent variables, based on secondary data sources. Examples of other studies using such approaches are:

- using States as units of analysis, estimating relationship between quantum of various pesticides used and other relevant variables and morbidity rates from related diseases,
- Using households as units of analysis, analysing extent of child labour participation and health status of household members,
- Using command areas of major irrigation projects as units of analysis, analysing health status variables against a variety of relevant independent variables such as: income level of people, health care expenditure, health input variables (curative and preventive), educational status of people etc.

KEY ISSUES FOR DISCUSSION

The wide scope of strengthening research support for policy analysis on intersectoral action is amply clear from the preceding discussion. The issue now is how to ensure that appropriate data as elucidated, are collected, analysed, disseminated and utilized.

DATA GENERATION AND ANALYSIS

One may raise a series of questions such as under:

- i) What mechanisms do we have in the country for: (a) health data collection. (b) general socio-economic data at household level, and (c) publication of official statistics?
- ii) How to activate these agencies to collect and analyse data required for policy analysis on intersectoral action?
- iii) What steps are necessary to ensure that non-health sectors collect, analyze and report relevant health data?
- iv) Are any new organizations or research councils required to spearhead intersectoral policy research, or any of the existing councils can be re-oriented, or is a mechanism linking relevant research councils required?

- v) Does the country have the research manpower required to carry out the types of research needed using methodologies elucidated earlier? How to mobilize this manpower, train them, and motivate them to undertake inter-sectoral policy research in support of health?
- vi) Are there enough research funds available for the research needed? What can be done by WHO and other international and bilateral agencies to help augment research support and channelize funds for appropriate intersectoral policy-oriented research?

DISSEMINATION OF DATA

Not only that data relevant for intersectoral policy analysis are scarce, but also such data are not sufficiently disseminated to concerned policy makers. Questions such as set out below need to be discussed in this context.

- i) Are there journals, newsletters, annual reports publishing intersectoral research information? What can be done to promote greater dissemination of research information to policy makers using these media?
- ii) Should the reach of available media be inadequate, what new medium or forum be created to resolve the problem?

UTILIZATION OF DATA

The most frustrating experience of researchers, especially in developing countries, is that the painstakingly produced research information are often not utilized meaningfully for policy-making and planning. This is partly due to the fact that researchers often fail to consider the data needs of policy makers and churn out inappropriate research information. This happens sometimes because of policy makers' inertia to spell out their information needs. Policies are also often made in a hurry due to political compulsions and within constraints posed by vested interests. A thorough analysis of the policy-making process in a country should discuss questions such as under:

- i) What policy decisions have recently been made by the government?
- ii) What is the data base of these decisions? Have any available research information been utilized?

- iii) Have any gaps in research information or service statistics been discovered while formulating these policies?

Policy analysis using methodologies, such as elucidated here, is expected to promote concerted intersectoral action to help achieve the goal of Health for All by the Year 2000.

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...Continued from inside front cover

The Authors' efforts will be greatly rewarded if the materials incorporated in this volume are used as teaching materials for graduate programmes, or as background documents for holding seminars or symposia at international, regional or national levels, with participants drawn from health and other related sectors. Such discussions will no doubt help in promoting beneficial intersectoral collaboration in support of the proclaimed goal of Health for All by the Year 2000.

About the Editor

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